Energy Use in South Carolina's Public Facilities

2004-2008

Annual Report

Prepared by the
South Carolina Energy Office
State Budget and Control Board

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Executive Summary

This report is prepared in partial response to the requirements of the 1992 South Carolina Energy Efficiency Act, which requires state agencies and public schools to consider energy conservation, develop energy plans, and report on consumption. South Carolina offers a statewide, web-based energy accounting system. This system, called Utility Direct, assists public facilities with tracking their energy costs and usage in order to identify problems and savings opportunities. Data provided by public facilities (see Methodology in Appendix B) are compiled and reported to each facility and to decision makers throughout the state.

Public facilities are grouped by type: state agencies, K-12 school districts, residential colleges and universities and non-residential colleges and universities (see Appendix C). Each organization can benchmark its energy use against that of similar facilities, allowing efficient organizations to be recognized, and helping to identify problems particular to each organization. The intent of the report is to assist all public entities in focusing on areas where energy conservation will be of greatest benefit.

Two performance indicators are used to compare energy consumption for public facilities: the annual energy use per square foot and annual cost per square foot. Both indicators are calculated using adjusted figures that exclude data for unheated buildings, outdoor lighting, and other charges with no associated square footage. Fuel usage is converted to the equivalent British thermal unit (Btu), so that the energy efficiency of buildings using different fuels can be readily compared regardless of variations in energy price by fuel types and over time.

As shown in Table 1 below, since 2004 square footage for these public facilities has increased by nearly ten percent, and the amount of energy-demanding technology installed has steadily increased. During this period, energy prices have risen sharply, leading to an increase of almost 31 percent in total energy costs. Fortunately for public budgets, public facilities have been able to institute energy conservation measures so successfully that total energy use only increased by about six percent. This success is also highlighted by the fact that energy use per square foot has actually decreased by almost three percent, while energy cost per square foot has increased by nearly 20 percent.

Table 1. Public Facilities - Percent Changes 2004-2008

Square Footage	Total Energy Cost ($)	Total Energy Use (kBtu)	Energy Cost per Square Foot ($)	Energy Use per Square Foot (kBtu)
9.58%	30.65%	6.04%	19.66%	-2.47%

This reduction in energy use per square foot results in substantial savings in energy cost. In 2008, South Carolina public facilities saved over $7 million in energy costs compared to 2004 as a result of greater energy efficiency, as shown in Table 2 below. The only group to experience an increase in energy use per square foot during this period was non-residential colleges. This was probably due to increased energy-consuming technology and extended operating hours.

Table 2. Public Facilities Energy Cost Savings 2004 - 2008

Type	2004 Use kBtu/ Sq.Ft.	2008 Use kBtu/ Sq.Ft.	Change in Use kBtu/Sq.Ft.	2008 Conditioned Sq.Ft. (millions)	2008 $/kBtu	Savings*
School Districts	45.4	44.5	.9	120,042,690	$0.025	$2,712,073.47
State Agencies	116.3	115.0	1.3	21,827,988	$0.018	$506,670.23
Res. Colleges	131.2	131.1	.1	32,992,300	$0.015	$49,565.44
Non-Res. Colleges	72.0	72.8	-.8	8,408,635	$0.022	($147,189.68)
Total	71.3	69.4	1.9	183,271,613	$0.020	$7,006,417.79

*See Appendix B for methodology used to calculate savings.

A snapshot of the 2008 square footage, cost per square foot, and use (kBtu) per square foot is given in Table 3, below. The 85 school districts with their 1,469 school buildings have, by far, the greatest overall conditioned square footage of the four types and the lowest cost and use per square foot. School buildings do not operate 24 hours per day or every day of the year. Their lower cost and use per square foot reflect these operational patterns.

Table 3. Public Facilities 2008 Summary Data by Facility Type

Type	Conditioned Sq. Ft. (millions)	Cost/Sq. Ft.	kBtu/Sq. Ft.
School Districts	120,042,690	$1.12	44.6
Residential Colleges	32,992,300	$1.97	131.1
State Agencies	21,827,988	$2.05	115.0
Non-residential Colleges	8,408,635	$1.59	72.8

Residential colleges, which house a significant proportion of their student populations, have the second highest overall square footage. The residence halls of these colleges operate 24 hours per day, and most colleges operate the entire year. These operational standards are reflected in higher cost and use per square foot than for school districts. Non-residential colleges, in contrast, have both lower square footage and lower cost and use per square foot. State agencies represent a more diverse group than the school and college categories. Some agencies, such as the South Carolina Department of Corrections, operate continuously with high energy demands. Other regulatory, rather than direct service agencies operate on more traditional schedules and in standard office buildings, resulting in lower energy needs.

With the passage of Act 318 in 2008 by the South Carolina General Assembly, school districts, public colleges and universities, and state agencies were required to develop an energy conservation

plan with a goal to reduce energy consumption (measured in use per square foot) by at least one percent annually for five consecutive years beginning July 1, 2008. The plan must also have a goal of ultimately reducing energy consumption for buildings in use on July 1, 2008, by 20 percent by July 1, 2020, relative to year 2000 levels. These targets, combined with steadily rising energy costs, will make it imperative for South Carolina's public facilities to reduce their energy use through even greater energy efficiency gains. This publication is designed to aid public facilities in their analyses of opportunities for increasing energy efficiency. The full report details energy data and analyzes trends for all four types of public facilities as well as each individual organization.

INTRODUCTION

This report summarizes fiscal years 2004-2008 non-transportation energy consumption for 85 public school districts, 35 state agencies and 33 public universities and colleges in South Carolina. Reporting on long-term energy consumption for public sector facilities can then drive informed decision-making. Only with valid and reliable measurements of energy consumption and cost can conservation measures be devised to generate energy use and cost savings for public facilities. This report also includes success stories that can be used as models for others to follow in reducing energy costs across the state's facilities.

A change in the reporting of consumption data occurred with the compilation of this 2004-2008 report. Previously, energy data were extracted from multiple formats and combined into spreadsheets. Where building level data were available, exclusion criteria were applied (see Appendix B). For the 2004-2008 report, consumption data for each of the report years were entered in the SCEO-maintained energy accounting software program, Utility Direct. During this process, consumption data were subjected to intense review and, where appropriate, corrections or additions were made using the most current data available. A feature of Utility Direct permits the collection of information specifying the function of each individual building. New exclusion criteria were developed based on these specifications and are detailed in Appendix B.

Energy use and cost are reported for public facilities as a whole and for each of four categories of public facilities that are, within each type, roughly similar: public school districts, state agencies, residential colleges/universities, and non-residential colleges/universities.

Energy statistics reported include:

1. total energy cost
2. energy cost by fuel type
3. energy cost per unit of energy
4. total square footage of conditioned space
5. energy use for buildings
6. energy cost for buildings
7. energy use per square foot for buildings
8. energy cost per square foot for buildings

Total energy cost, energy cost by fuel type, and cost per unit of energy (energy statistics 1 – 3) include costs for sports fields, outdoor lighting, parking garage lighting, and other energy use not associated with conditioned buildings. When calculating energy use and cost per square foot statistics (energy statistics 4-8), only the use and cost associated with conditioned buildings are included. Several special cases are also considered. Transmission towers with very little square footage, but high use and cost are not included in the calculation of statistics 4-8. Unheated facilities such as warehouses, sheds, and temporary or seasonal facilities, such as guard shacks and camp cabins, are not included in the calculation of statistics 4-8. Finally, portable classrooms, which often go in and out of service on an unpredictable basis, are not included in the calculations of statistics 4-8.

Fuel usage was converted to the equivalent British thermal unit (Btu). A Btu is equal to the quantity of heat (generated by consuming fuel of any type) required to raise the temperature of one pound of water by one degree Fahrenheit. Two standard measures reported are kBtu (1,000 Btu) and 100 kBtu (100,000 Btu). Through conversion of energy units such as electricity kilowatt hours, and natural gas therms to these standard measurements, the energy efficiency of buildings using different fuel types can be readily compared regardless of variations in energy price by fuel type and over time.

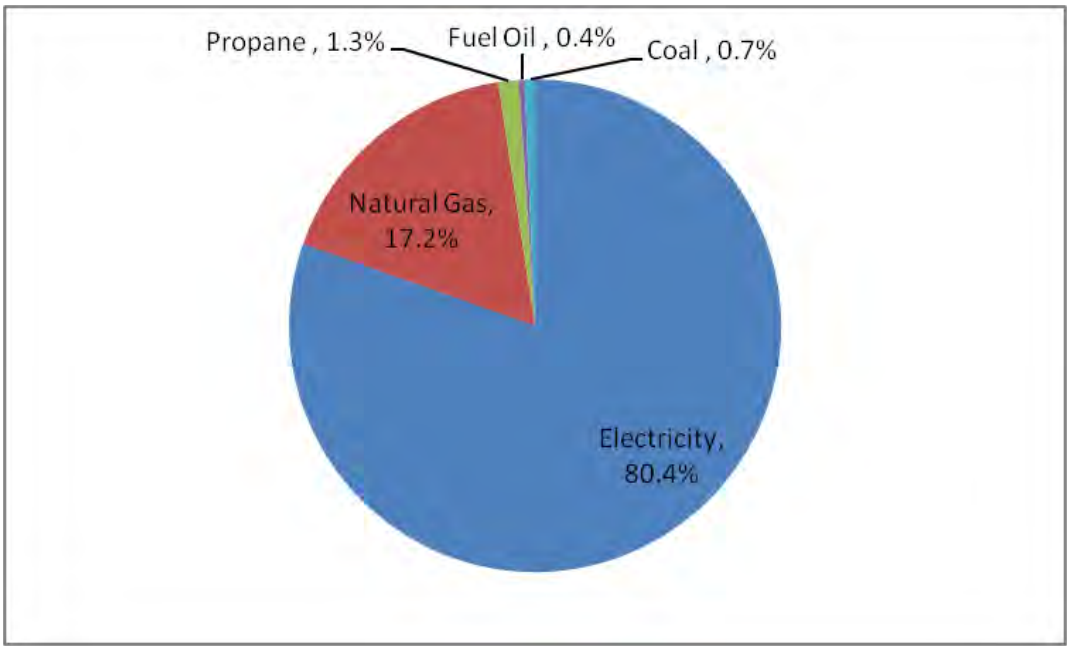
As this report demonstrates, there is variation in energy use and cost among participating public facilities. Some of the reasons for the variation include the following:

- Age of buildings – Older buildings were often built with less concern for energy efficiency. Deterioration over the years and limited technology compound this effect.
- Energy conservation measures – Many facilities have implemented energy conservation plans. The measures undertaken range from low-cost and no-cost methods of energy use reduction to extensive energy conservation retrofits.
- Energy efficient design – Great strides have been made in recent decades to incorporate energy efficiency into building design. Many South Carolina public facilities reflect these advances.
- Hours of operation – Some buildings are lightly used, while some are in use 24 hours a day. Some facilities, such as schools, are in use only nine or ten months of the year.
- Building uses – Although many state-owned buildings are primarily office buildings, the functions of the public facilities vary greatly. Libraries, cafeterias, warehouses, laboratories, meeting facilities, prisons, maintenance garages and security buildings, for example, have widely varying energy needs.
- Metering issues – Sometimes outside lights are metered to buildings. If the building is small and the outdoor lighting is extensive (e.g., parking areas), this can skew the per square foot figures for cost and use. In addition, there are cases where multiple buildings are served by one meter. This, too, can alter the square foot figures for cost and use.
- Equipment – Facilities housing large amounts of electronic equipment (including computers) will show high cost and usage results. This is particularly true of university and hospital buildings.
- Fuel types and prices – Fuel types vary in cost, with electricity generally being more expensive. Fuel prices also can vary by region, utility, and size of purchaser.
- Climate – In the upper part of the state, air conditioning is needed considerably less than in the rest of the state. Conversely, this region is likely to need more winter heating.
- Variations in weather from year to year – Energy use and cost can be impacted significantly by cooler summers and warmer winters, or vice-versa.

South Carolina Public Facilities Energy Use and Cost

In 2008, South Carolina's 153 school districts and state agencies, including colleges and universities, that own buildings spent more than $266 million dollars on non-transportation energy. Their main source of this energy is electricity, which represents nearly four-fifths of the total (Figure 1). Natural gas usage accounts for nearly a fifth of the total while fuel oil, propane and coal constitute barely one percent each. Electricity and natural gas, taken together, account for 98 percent of total energy costs.

Figure 1. Public Facilities Percent of Total Energy Costs by Fuel Type 2008



In order to make comparisons among years, statistics in the graphs and tables of this section are adjusted to represent all 153 public entities, with missing data estimated using calculations based on historical trends. A list of public facilities is given in Appendix C.

Cost of energy depends on the comparative pricing of fuel types and the relative proportions of different fuel types consumed. The main source of energy for public facilities is electricity, which represents 80.4 percent of the total energy used. Natural gas usage is 17.2 percent of the total. This means that electricity and natural gas, taken together, account for more than 97 percent of total non-transportation energy costs while fuel oil, propane and coal combined constitute two percent. In 2008, South Carolina's 153 state agencies, school districts, and colleges spent nearly $267 million dollars on non-transportation energy. As seen in Table 4 below, there are considerable differences in fuel expenditures among school districts, state agencies, and colleges.

Table 4. Public Facilities Total Energy Cost by Fuel Type by Facility Type 2008

	School Districts	State Agencies	Residential Colleges	Non-residential Colleges	Total
Electricity	$123,641,273	$34,076,774	$45,290,636	$11,560,480	$214,569,163
Natural Gas	$13,719,903	$11,067,042	$19,113,130	$2,165,984	$46,066,059
Fuel Oil	$1,073,505	$2,340,206	$40,768	$10,657	$3,465,135
Propane	$96,311	$508,575	$389,303	$0	$994,189
Coal	$0	$0	$1,907,886	$0	$1,907,886
Total	$138,530,991	$47,992,597	$66,741,722	$13,737,121	$267,002,431

The pricing of fuel for different facility types varies also, as seen in Table 5 below. Residential colleges benefited from the lowest unit energy costs for electricity while school districts pay the highest. Of the four types of public facilities, school districts also derive the highest proportion of their energy from electricity, and electricity is the most expensive of the major fuel types. This is important to keep in mind when considering the mix of fuel types used by public facilities as detailed in the following sections.

Table 5. Public Facilities Energy Cost per Unit by Fuel Type 2008

Cost/Fuel type Unit	School Districts	State Agencies	Residential Colleges	Non-residential Colleges
Electricity ($/kWh)	$0.093	$0.076	$0.064	$0.077
Natural Gas ($/therm)	$1.39	$0.90	$1.60	$1.63
Fuel Oil ($/gallon)	$3.49	$3.13	N/A	N/A
Propane ($/gallon)	$1.03	$1.75	$1.63	N/A
Coal ($/ton)	N/A	N/A	$168.78	N/A

Note: Clemson University is the only public facility that uses coal as an energy source

The price per quantity of energy purchased (Table 6) shows variation among types of public facilities. Residential colleges benefited from the lowest unit energy cost per kWh for electricity, while public school districts paid the most. Non-residential colleges paid the highest cost per kBtu for natural gas. Among the different fuels, electricity is the most expensive energy source for all four types of public facilities. This table also shows that the cost per kBtu for all organization types increased dramatically from 2004 to 2008.

Table 6. Public Facilities Energy Cost per kBtu 2004-2008

Cost ($/kBtu)	School Districts	State Agencies	Residential Colleges and Universities	Non-residential Colleges and Universities
2004	$0.021	$0.015	$0.012	$0.018
2005	$0.022	$0.016	$0.013	$0.019
2006	$0.024	$0.017	$0.014	$0.020
2007	$0.024	$0.017	$0.014	$0.021
2008	$0.025	$0.018	$0.015	$0.022

As shown in Table 7, energy cost per square foot soared, increasing 19.7 percent from 2004 to 2008. At the same time, energy use per square foot dropped by 2.5 percent steadily from 2004-2008 for all public entities combined. Square footage for public facilities increased from 2004 to 2008 by nearly 10 percent. Energy prices soared during this period, leading to an overall increase in energy costs of 30.7 percent, and an increase of nearly 20 percent in energy cost per square foot. Simultaneously, the amount of energy-demanding technology installed has increased. This could have been disastrous for public budgets, but public institutions were quite successful in implementing energy conservation efforts. Total use rose by only 6 percent during this period, and overall energy use per square foot actually declined by 2.5 percent.

Table 7. Public Facilities - Percent Changes 2004-2008

Square Footage	Total Energy Cost ($)	Total Energy Use (kBtu)	Energy Cost per Square Foot ($)	Energy Use per Square Foot (kBtu)
9.58%	30.7%	6.0%	19.7%	-2.5%

There were significant variations in the rates of change among organization types. School districts were able to reduce their energy use per square foot by nearly two percent between 2004 and 2008 (Table 8), counteracting an increase in cost per square foot of almost 18 percent. State agencies and non-residential colleges were able to reduce their energy use per square foot by about one percent, which helped offset increases in energy cost per square foot of more than 20 percent. Residential colleges and universities experienced an increase in energy cost per square of nearly 30 percent from 2004 to 2008, while holding constant energy use per square foot.

Table 8. Public Facilities by Organization Type - Percent Changes 2004-2008

Organization Type	Square Footage	Total Energy Cost ($)	Total Energy Use (kBtu)	Energy Cost per Square Foot ($)	Energy Use per Square Foot (kBtu)
School Districts	10.55%	30.17%	8.38%	17.88%	-1.82%
State Agencies	-1.05%	20.56%	-0.31%	20.53%	-1.07%
Non-residential Colleges and Universities	12.35%	36.79%	12.68%	22.93%	1.20%
Residential Colleges and Universities	13.27%	38.80%	6.39%	29.88%	-0.06%

Table 9 and the following charts show year to year changes for all public facilities for the period from 2004 to 2008 for the following categories:

- Conditioned square footage (Figure 2)
- Total energy costs (Figure 3)
- Total energy use (Figure 4)
- Energy cost per square foot (Figure 5)
- Energy use per square foot (Figure 6)

Overall, these tables and graphs show that public facilities have steadily reduced energy use per square foot during this period, despite the increase in use of electronic devices, but total energy cost and cost per square foot have skyrocketed.

Table 9. Public Facilities Energy Statistics Fiscal Year 2004-2008

Fiscal Year	Square Footage (millions)	Total Cost ($millions)	Cost ($)/Sq. Ft.	Total Use kBtus (millions)	Use (kBtu)/ Sq. Ft.
2004	181.3	$204.4	$1.17	12,404	71.6
2005	182.8	$216.0	$1.22	12,498	71.3
2006	187.0	$243.1	$1.35	12,758	71.3
2007	193.5	$249.2	$1.34	12,988	70.3
2008	198.7	$267.0	$1.40	13,153	69.8

Table 10. Public Facilities Energy Use (kBtu) per Square Foot by Facility Type 2004-2008

Fiscal Year	School Districts	State Agencies	Residential Colleges	Non-residential Colleges
2004	45.4	116.3	131.2	72.0
2005	44.7	118.0	132.7	71.5
2006	45.1	117.2	132.3	72.6
2007	44.1	115.9	134.1	72.6
2008	44.5	115.0	131.1	72.8

Figure 2. Public Facilities Total Conditioned Square Footage 2004-2008

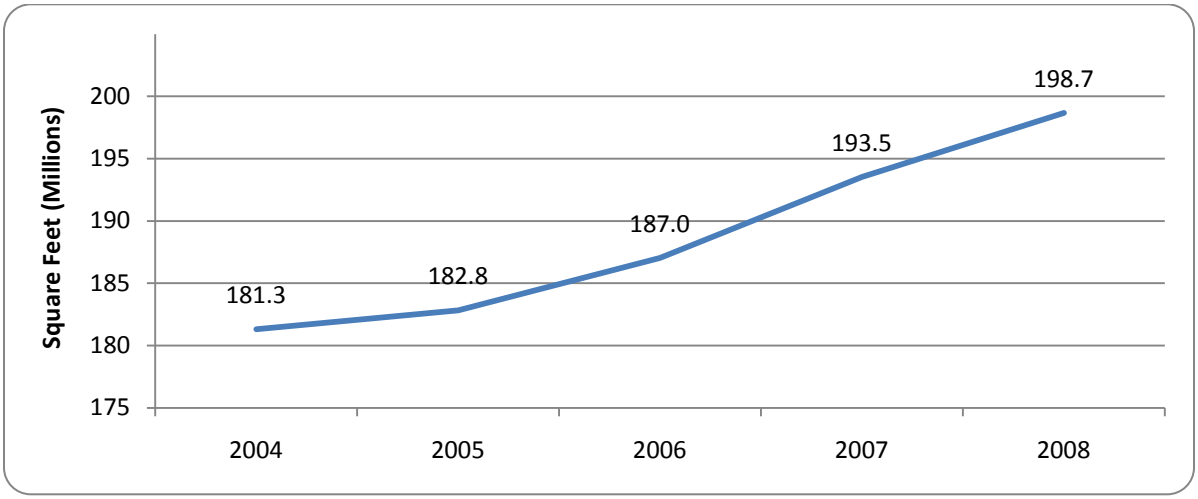


Figure 3. Public Facilities Total Energy Cost 2004-2008

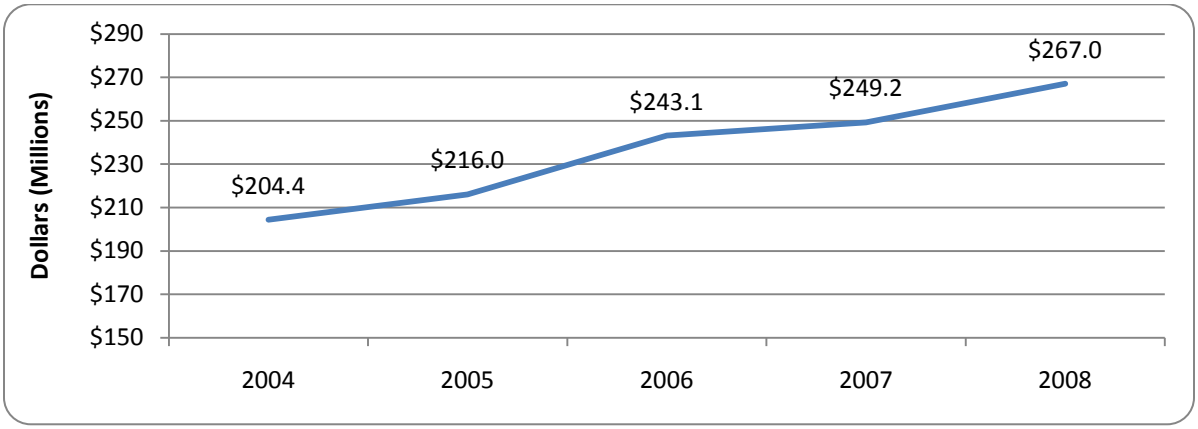


Figure 4. Public Facilities Total Use 2004-2008

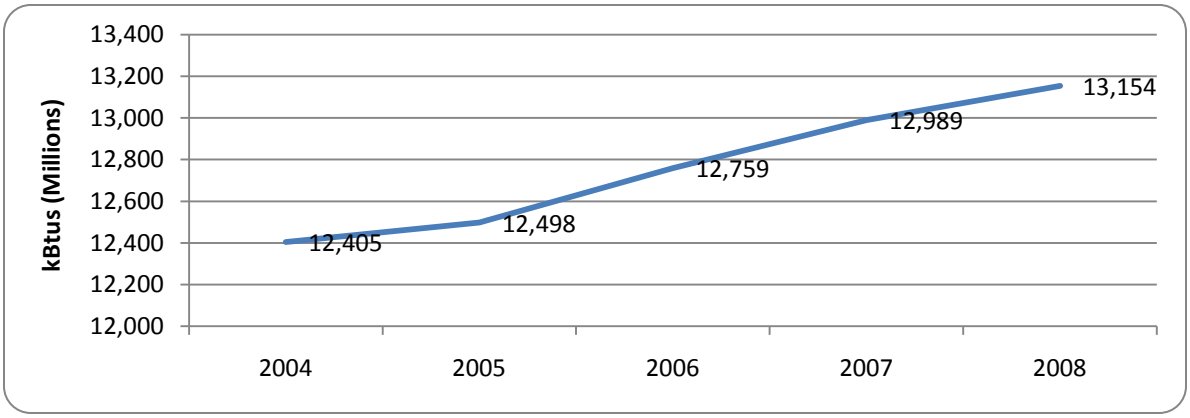


Figure 5. Public Facilities Energy Cost per Square Foot 2004-2008

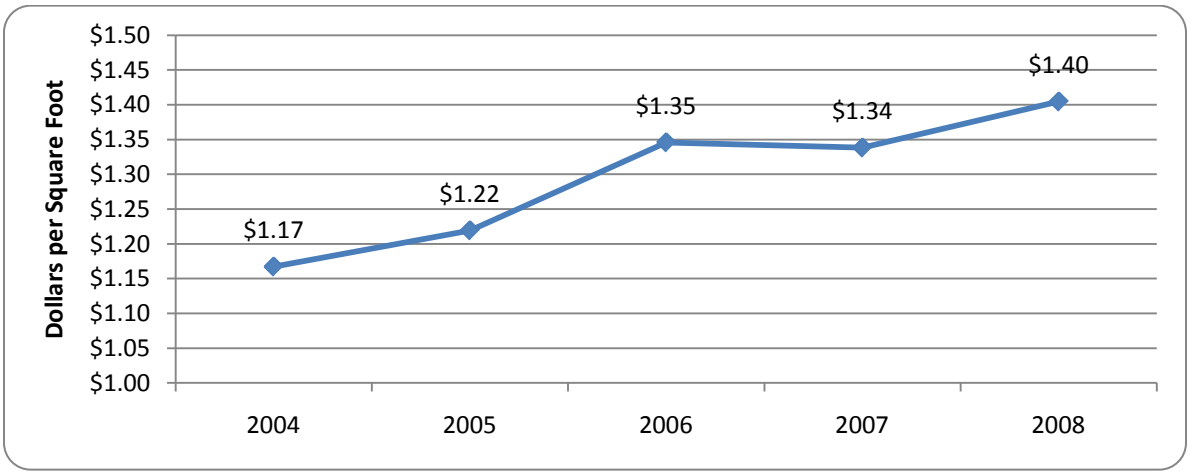
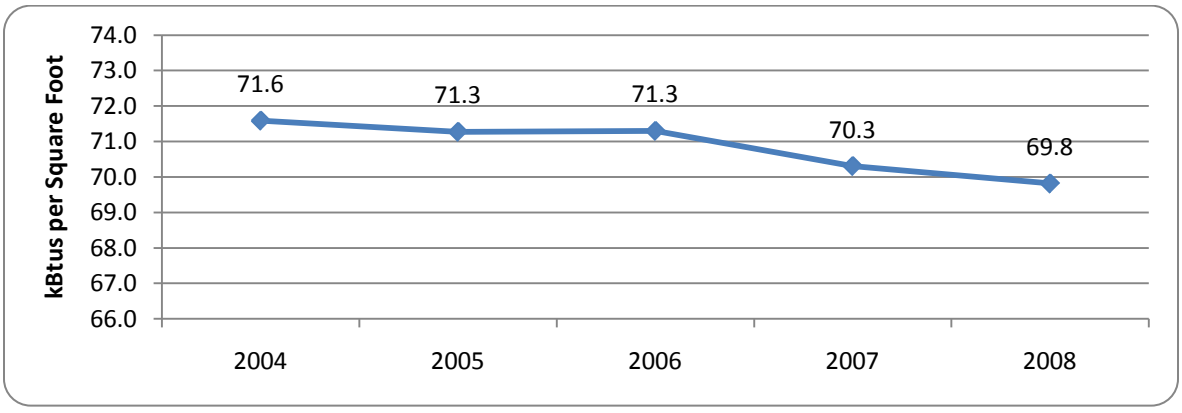


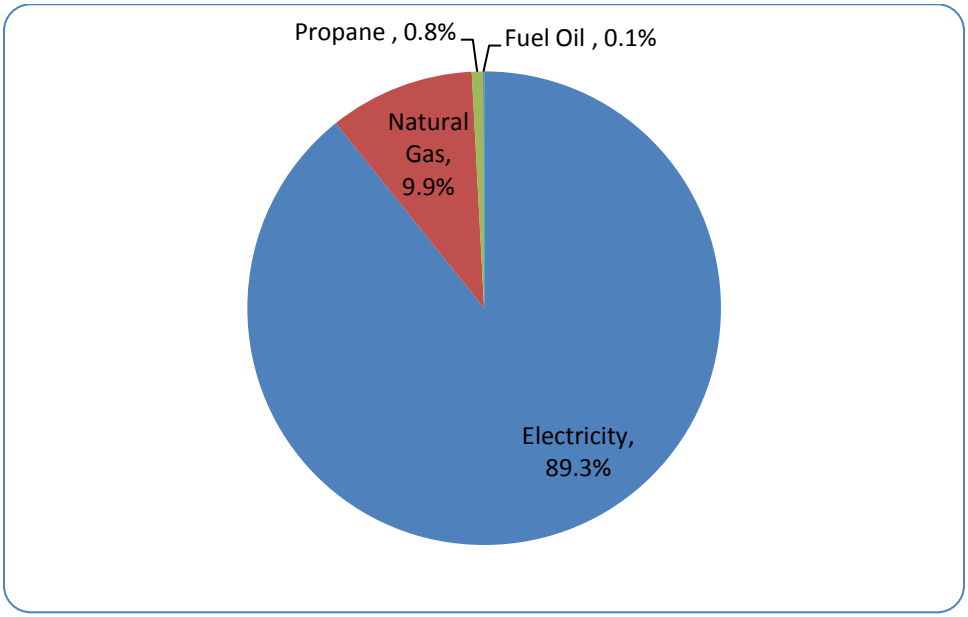
Figure 6. Public Facilities Energy Use per Square Foot 2004-2008



South Carolina School District Energy Use and Cost

School districts' main source of energy is electricity, representing nearly 90 percent of the total. Natural gas usage is smaller at 9.9 percent, while fuel oil and propane combined constitute less than one percent (Figure 7). This pattern of energy use affects energy costs because electricity costs significantly more per kBtu than natural gas.

Figure 7. School District Percent of Total Energy Costs by Fuel Type 2008



There are several factors that can influence energy cost and use per square foot data for school districts. School buildings are constantly going in and out of use, as they are renovated and/or replaced. Additionally, some school districts are able to separately meter energy use and cost for such applications as outdoor lighting, portable classrooms, and outdoor athletic facilities, while others are not. Those school districts that are able to meter such use and cost separately will generally have lower use and cost data than similar schools that cannot.

Table 13 and the charts following it show year to year changes for school districts for the period from 2004 to 2008 for the following categories:

- Conditioned square footage (Figure 8)
- Total energy costs (Figure 9)
- Total energy use (Figure 10)
- Energy cost per square foot (Figure 11)
- Energy use per square foot (Figure 12)

Overall, these tables and graphs show that schools have slightly reduced energy use per square foot during this period, while total energy cost and cost per square foot have skyrocketed.

Table 11 below shows that square footage for school districts rose steadily (by nearly 11 percent) from 2004 -2008. Total energy use rose by more than eight percent during the same time, while total energy cost rose by more than 30 percent. Energy cost per square foot rose by almost 18 percent. Schools have increased their use of technology and occupancy hours, but were able to reduce their energy use per square foot by more than two percent during this period, enabling them to mitigate the negative budgetary effects of higher costs. Schools have the added burden of obtaining a high percent of their energy use from electricity - the most expensive source.

Table 11: School Districts - Percent Changes 2004-2008

Square Footage	Total Energy Cost ($)	Total Energy Use (kBtu)	Energy Cost per Square Foot ($)	Energy Use per Square Foot (kBtu)
10.55%	30.17%	8.38%	17.88%	-2.47%

The importance of efforts put forth by school districts to reduce their energy use per square foot is highlighted by the statistics in Table 12 below. Square footage increased from about 113 million to

almost 125 million, while total energy use rose from 5,048 million kBtus to 5,471 million kBtus. Even more important for public budgets, total energy cost per square foot rose from $0.95 in 2004 to $1.12 in 2008, and total energy cost increased from $106 million to more than $138 million. School districts were able to reduce their energy use per square foot from 45.4 kBtus/sf to 44.5 kBtus/sf through their energy conservation efforts.

Table 12. School District Energy Statistics 2004-2008

Fiscal Year	Square Footage (millions)	Total Cost ($millions)	Cost ($)/Sq. Ft.	Total Use kBtus (millions)	Use kBtu)/ Sq. Ft.
2004	112.9	$106.4	$0.95	5,048	45.4
2005	114.3	$111.2	$0.97	5,065	44.7
2006	117.4	$124.0	$1.06	5,230	45.1
2007	122.4	$129.1	$1.07	5,304	44.1
2008	124.8	$138.5	$1.12	5,471	44.5

Figure 8. School Districts Total Square Feet 2004-2008

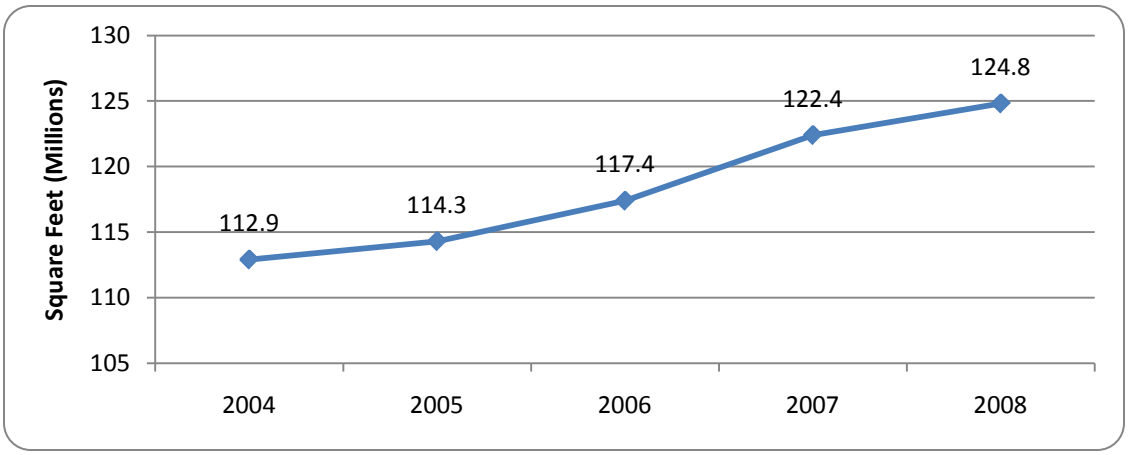


Figure 9. School Districts Total Cost 2004-2008

Figure 10. School Districts Total Energy Use 2004-2008

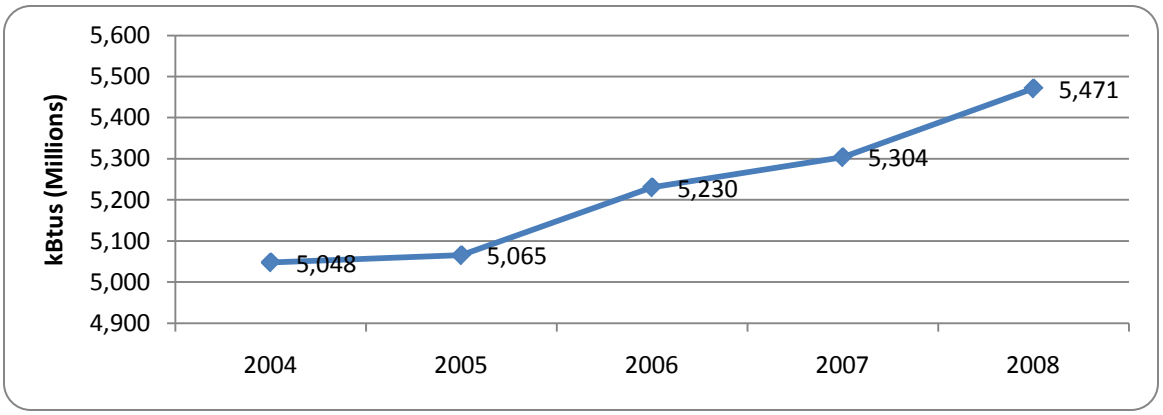


Figure 11. School Districts Energy Cost per Square Foot 2004-2008

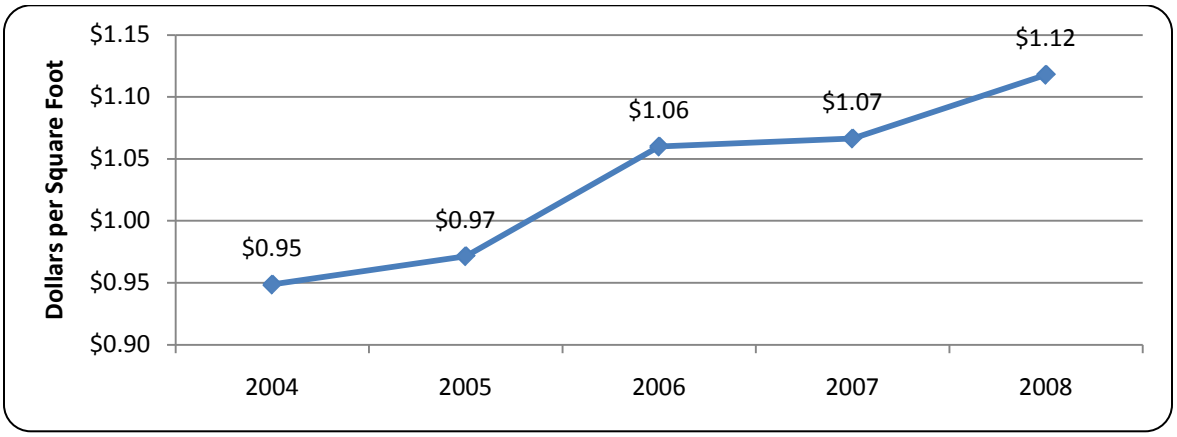
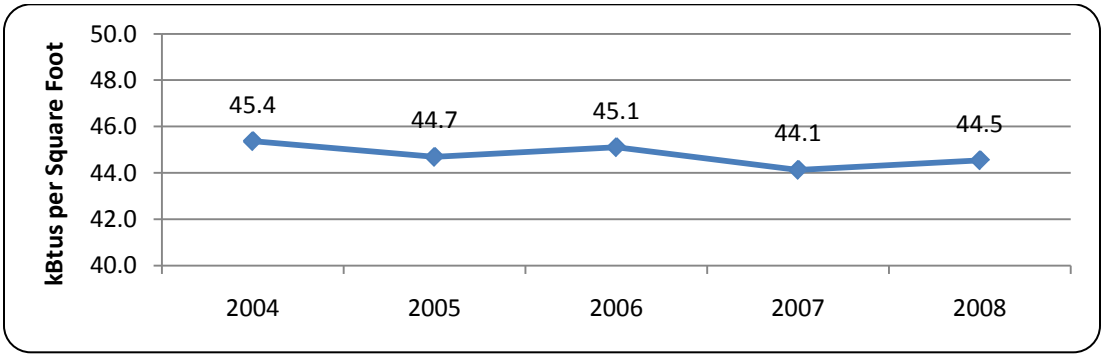


Figure 12. School District Energy Use per Square Foot 2004-2008



The following tables present the use and cost per square foot for school districts ranking from lowest to highest 2008 use per square foot (Table 13) and lowest to highest 2008 cost per square foot (Table 14).

Table 13. School District Energy Use (kBtu) per Square Foot 2004-2008 (Sorted ascending by 2008 data)

Organization	2004	2005	2006	2007	2008
Williamsburg School District	27.9	26.8	26.2	26.0	24.6
Lee School District	33.5	32.2	32.1	29.3	29.6
Lexington School District 3	28.6	29.2	31.2	30.0	29.9
Florence School District 2	28.0	28.7	29.7	29.4	30.0
Clarendon School District 1	31.6	27.1	28.7	30.6	32.1
Dillon School District 1	32.2	33.7	33.5	31.8	33.0
Barnwell School District 19	32.2	32.4	31.7	33.5	33.0
Florence School District 3	35.1	34.4	34.8	33.1	33.0
Lexington/Richland School District 5	34.3	34.6	35.4	32.2	33.1
Edgefield School District	37.9	34.5	31.6	31.1	33.7
Laurens School District 55	31.9	27.7	29.4	32.2	34.3
Newberry School District	40.8	38.9	39.3	34.1	34.7
Darlington School District	37.1	35.1	35.0	35.0	34.8
Marion School District 2	33.9	35.7	35.3	34.0	34.9
Sumter School District 17	32.8	34.1	36.0	34.9	35.2
Abbeville School District	39.3	40.1	40.8	38.0	35.9
Hampton School District 1	40.4	37.7	37.6	34.2	35.9
Chesterfield School District	40.6	38.8	39.1	36.6	36.0
Georgetown School District	38.5	39.4	38.6	36.2	36.1

Marion School District 7	35.8	37.3	36.4	35.8	36.4
Saluda School District	33.6	33.3	33.2	36.2	36.4
Sumter School District 2	31.4	30.1	32.5	31.3	36.4
Greenwood School District 51	38.8	44.1	40.8	36.3	36.5
Dillon School District 2	43.3	37.1	36.5	39.0	36.9
Clarendon School District 2	41.5	36.9	35.2	36.5	37.2
Lexington School District 2	36.5	35.6	36.1	35.9	37.3
Dillon School District 3	37.2	35.5	37.7	36.7	37.4
Lexington School District 1	39.2	39.7	38.3	39.7	37.5
Clarendon School District 3	36.0	28.6	33.3	31.9	37.7
Florence School District 4	36.7	34.9	34.4	33.1	38.1
Florence School District 1	34.7	36.1	36.7	37.3	38.2
Orangeburg School District 3	34.2	34.4	35.0	36.2	38.3
Spartanburg School District 5	38.7	37.3	38.4	38.7	38.5
Florence School District 5	37.9	38.5	38.4	37.8	38.5
Union School District	39.3	36.7	36.2	38.2	38.7
Bamberg School District 1	34.4	38.2	38.8	37.4	38.8
Anderson School District 4	39.5	39.0	39.5	38.5	38.9
Spartanburg School District 7	47.2	46.1	40.3	39.3	39.6
York School District 2	43.9	42.3	41.0	37.7	39.9
Berkeley School District	45.9	47.2	44.5	40.4	40.2
Anderson School District 5	39.1	39.5	36.8	36.2	40.3
Spartanburg School District 1	39.5	32.5	29.9	39.8	40.4
Orangeburg School District 5	42.4	41.8	42.3	41.3	40.7
Marlboro School District	35.4	34.9	35.7	35.7	40.9
Beaufort School District	53.1	54.0	57.4	51.6	41.3
Horry School District	44.4	41.5	38.4	40.2	41.4
Barnwell School District 45	40.1	36.6	35.2	35.8	41.6
York School District 1	39.3	41.5	41.8	40.2	41.8
Anderson School District 3	38.3	38.4	41.5	41.0	41.8
Aiken School District	42.4	40.7	42.1	41.4	41.9
Marion School District 1	48.4	46.3	47.6	42.4	42.5
Spartanburg School District 3	37.8	36.4	34.8	39.1	42.5
Laurens School District 56	37.3	42.1	39.5	38.9	42.6
Lancaster School District	45.6	43.4	44.2	41.7	42.6
Spartanburg School District 4	47.4	44.5	46.2	46.8	42.6
Dorchester School District 4	41.1	41.4	43.7	45.3	43.2
Anderson School District 1	45.1	45.3	47.0	42.2	43.3
Lexington School District 4	39.0	36.6	37.9	38.3	43.3
Colleton School District	48.0	49.0	50.0	45.6	43.6
Fairfield School District	54.0	48.8	48.2	48.1	43.8
Chester School District	44.3	47.2	45.0	46.7	44.1
Calhoun School District	45.2	41.0	44.5	43.6	44.4
York School District 4	41.0	42.0	43.3	44.4	44.8
Richland School District 1	46.7	46.2	47.6	46.5	45.7
Oconee School District	42.4	40.8	42.3	44.0	46.0
Dorchester School District 2	51.4	46.5	46.7	44.4	46.5
Kershaw School District	46.9	45.0	44.2	45.6	46.5

York School District 3	51.1	48.4	48.3	46.8	46.7
Jasper School District	53.9	49.6	52.1	45.6	47.0
Barnwell School District 29	51.5	50.2	44.3	46.8	47.2
Charleston School District	51.4	49.9	48.8	47.7	47.3
Richland School District 2	45.0	46.0	50.1	47.4	47.6
Orangeburg School District 4	43.6	43.0	50.4	44.8	48.0
Pickens School District	47.2	46.9	48.5	50.8	49.2
Anderson School District 2	58.2	59.2	55.4	52.3	49.2
Spartanburg School District 6	53.3	58.3	50.8	49.6	50.2
McCormick School District	51.0	50.3	51.0	49.8	50.3
Cherokee School District	43.1	49.6	49.4	49.4	53.1
Greenwood School District 52	51.2	51.5	51.0	50.4	54.7
Allendale School District	51.3	52.2	53.1	54.0	55.0
Bamberg School District 2	47.3	44.8	56.0	52.1	56.1
Hampton School District 2	54.0	54.7	57.6	56.3	56.7
Spartanburg School District 2	58.5	59.8	58.3	56.3	59.7
Greenwood School District 50	54.9	59.1	61.2	58.4	63.2
Greenville School District	65.3	63.9	67.0	64.9	66.7
Average for School Districts	45.4	44.7	45.1	44.1	44.5

Table 14. School District Energy Cost per Square Foot 2004-2008 (Sorted ascending by 2008 data)

Organization	2004	2005	2006	2007	2008
Laurens School District 55	$0.64	$0.57	$0.63	$0.68	$0.74
Bamberg School District 1	$0.60	$0.64	$0.78	$0.77	$0.75
Williamsburg School District	$0.74	$0.73	$0.75	$0.78	$0.77
Greenwood School District 51	$0.68	$0.78	$0.87	$0.75	$0.79
Clarendon School District 1	$0.88	$0.84	$0.85	$0.84	$0.80
Spartanburg School District 7	$0.83	$0.84	$0.79	$0.77	$0.81
Anderson School District 4	$0.70	$0.72	$0.79	$0.79	$0.83
Anderson School District 5	$0.70	$0.73	$0.73	$0.74	$0.84
Lexington School District 3	$0.66	$0.70	$0.83	$0.82	$0.86
Abbeville School District	$0.93	$0.95	$1.01	$0.93	$0.89
Anderson School District 1	$0.81	$0.82	$0.91	$0.87	$0.90
Lancaster School District	$0.79	$0.83	$0.92	$0.88	$0.90
Barnwell School District 19	$0.70	$0.79	$0.82	$0.89	$0.90
Florence School District 2	$0.72	$0.77	$0.84	$0.85	$0.90
Spartanburg School District 5	$0.75	$0.74	$0.81	$0.81	$0.91
Lexington/Richland School District 5	$0.75	$0.78	$0.92	$0.85	$0.91
Chester School District	$0.77	$0.85	$0.87	$0.88	$0.92
Darlington School District	$0.93	$0.91	$0.95	$0.95	$0.93
Spartanburg School District 3	$0.72	$0.72	$0.74	$0.82	$0.93
Sumter School District 17	$0.75	$0.77	$0.90	$0.91	$0.94
Hampton School District 1	$0.87	$0.87	$0.95	$0.89	$0.95
York School District 1	$0.80	$0.83	$0.89	$0.88	$0.96
York School District 2	$0.93	$0.92	$0.95	$0.91	$0.96
Dillon School District 1	$0.77	$0.84	$0.94	$0.93	$0.97

Edgefield School District	$0.77	$0.95	$0.86	$0.86	$0.97
Spartanburg School District 4	$0.85	$0.84	$0.95	$0.96	$0.97
Orangeburg School District 5	$0.81	$0.83	$0.91	$0.92	$0.97
Anderson School District 2	$0.89	$1.01	$0.98	$0.94	$0.97
Dorchester School District 4	$0.90	$0.95	$1.12	$1.18	$0.97
Spartanburg School District 1	$0.78	$0.65	$0.62	$0.95	$0.98
Florence School District 1	$0.75	$0.78	$0.89	$0.94	$0.99
Lexington School District 1	$0.89	$0.93	$0.96	$1.03	$1.00
Newberry School District	$0.95	$0.92	$1.02	$0.95	$1.01
Marion School District 7	$0.91	$0.96	$0.97	$0.99	$1.02
Lee School District	$0.92	$0.74	$0.96	$0.99	$1.02
Spartanburg School District 6	$0.91	$0.98	$0.98	$0.96	$1.02
Florence School District 3	$0.90	$0.88	$1.00	$0.99	$1.03
Lexington School District 2	$0.85	$0.85	$0.94	$0.96	$1.04
Marion School District 2	$0.91	$0.95	$1.03	$1.03	$1.04
Dillon School District 3	$0.85	$0.85	$0.97	$0.99	$1.04
Dillon School District 2	$0.96	$0.87	$0.99	$1.01	$1.05
Georgetown School District	$1.01	$0.96	$1.06	$1.03	$1.06
Union School District	$1.00	$0.91	$1.05	$1.02	$1.07
Pickens School District	$0.88	$0.98	$1.06	$1.09	$1.09
Greenwood School District 52	$0.83	$0.90	$1.00	$1.07	$1.10
Horry School District	$0.98	$0.99	$1.05	$1.04	$1.10
Saluda School District	$0.93	$1.04	$0.93	$1.02	$1.10
Chesterfield School District	$0.98	$0.96	$1.08	$1.08	$1.10
Berkeley School District	$1.02	$1.09	$1.10	$1.11	$1.11
York School District 4	$0.97	$0.98	$1.05	$1.09	$1.11
Anderson School District 3	$0.92	$0.94	$1.03	$1.03	$1.11
Laurens School District 56	$0.84	$0.96	$1.00	$0.97	$1.12
Orangeburg School District 4	$0.85	$0.90	$0.93	$1.01	$1.12
Clarendon School District 2	$0.98	$0.95	$1.02	$1.10	$1.13
York School District 3	$1.12	$1.18	$1.14	$1.12	$1.13
Barnwell School District 45	$0.87	$0.85	$0.84	$1.14	$1.14
Oconee School District	$0.83	$0.91	$1.02	$1.05	$1.14
Clarendon School District 3	$0.93	$0.76	$0.91	$0.94	$1.15
Cherokee School District	$0.85	$0.96	$1.06	$1.04	$1.15
Allendale School District	$0.94	$1.01	$1.10	$1.13	$1.16
Orangeburg School District 3	$0.79	$0.84	$1.03	$1.04	$1.16
Aiken School District	$0.91	$0.93	$1.08	$1.14	$1.16
Florence School District 4	$0.90	$0.95	$0.96	$1.02	$1.19
Florence School District 5	$0.91	$0.92	$0.92	$0.91	$1.20
Fairfield School District	$1.11	$1.13	$1.23	$1.23	$1.22
Lexington School District 4	$0.85	$0.90	$1.02	$1.04	$1.22
Sumter School District 2	$0.95	$0.96	$1.10	$1.13	$1.23
Spartanburg School District 2	$1.03	$1.08	$1.17	$1.12	$1.24
Marlboro School District	$0.87	$0.93	$0.95	$1.06	$1.24
McCormick School District	$1.05	$1.08	$1.18	$1.18	$1.24
Marion School District 1	$1.10	$1.11	$1.23	$1.20	$1.25
Barnwell School District 29	$1.06	$1.05	$1.11	$1.18	$1.25

Beaufort School District	$1.29	$1.35	$1.49	$1.44	$1.26
Greenwood School District 50	$0.87	$0.95	$1.13	$1.10	$1.26
Richland School District 1	$1.03	$1.04	$1.21	$1.23	$1.27
Greenville School District	$1.02	$1.06	$1.21	$1.16	$1.29
Calhoun School District	$1.08	$1.04	$1.26	$1.26	$1.30
Richland School District 2	$1.03	$1.05	$1.24	$1.21	$1.31
Charleston School District	$1.15	$1.16	$1.24	$1.26	$1.31
Dorchester School District 2	$1.19	$1.12	$1.21	$1.23	$1.34
Kershaw School District	$1.21	$1.12	$1.07	$1.26	$1.35
Jasper School District	$1.24	$1.20	$1.35	$1.38	$1.41
Bamberg School District 2	$1.03	$1.03	$1.45	$1.30	$1.42
Colleton School District	$1.31	$1.34	$1.38	$1.39	$1.45
Hampton School District 2	$1.20	$1.27	$1.46	$1.47	$1.53
Average for School Districts	$0.95	$0.97	$1.06	$1.07	$1.12

Note: Due to missing or insufficient data, energy use and consumption was either partially or completely estimated for the following school districts/years:

2004: Anderson SD 4, Bamberg SD 2, Barnwell School District 45, Clarendon SD 3, Colleton SD, Florence SD 4, McCormick SD, Orangeburg SD 5, Sumter School District 17
2005: Anderson SD 4, Clarendon School District 3, Colleton SD, Greenville School District, McCormick SD, Orangeburg SD 5
2006: Anderson SD 4, Allendale SD, Darlington SD, Kershaw SD, McCormick SD, Orangeburg SD 5
2007: Anderson SD 4, Anderson SD 5, Allendale SD, Darlington SD
2008: Allendale SD, Barnwell School District 19, Dorchester School District 2

Success Story: Georgetown School District

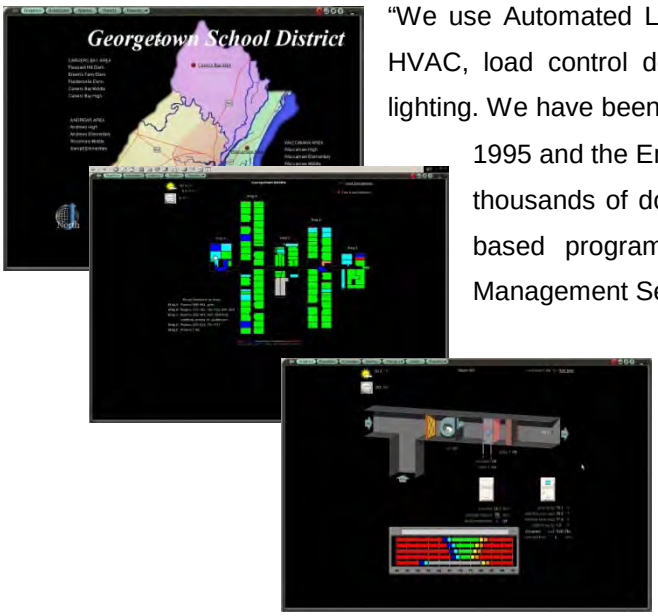
In the past three years, Georgetown School District has made improvements that reduced energy consumption *by over one million kBtus from fiscal year 2004 to fiscal year 2008 and that are projected to produce further reductions in fiscal year 2007(revise)*. The Energy Management Department upgraded the district's energy management system, replaced HVAC units, implemented "no cost" measures, and started tracking all utility bills. A three-year usage comparison chart illustrates the results.

The major capital improvement was the replacement of 91 rooftop HVAC units on five of the District's 17 schools. The new 14 SEER units use 410A refrigerant (which is non-ozone depleting) and variable speed indoor fan motors. In a side-by-side actual runtime comparison with the older 7 SEER units, the new units reduced usage up to 30 percent.

Several in-house projects, implemented at no cost other than staff time, generated annual savings of $93,000. These included removing lights from vending machines and changing the nighttime temperature setbacks. The district also restructured utility rates and identified billing errors.

Georgetown School District's Energy Manager, Tony Holcomb, has a three-pronged approach to energy management—technology, tracking, and education. He offered the following snapshots of the Energy Management Department's ongoing program.

The Energy Management System

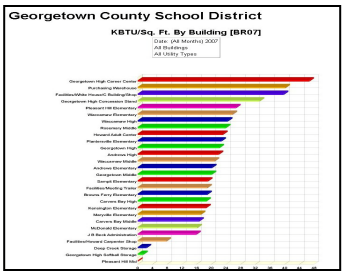


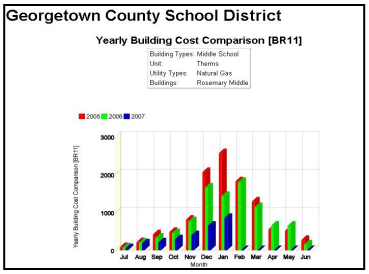
"We use Automated Logic's WebCTRL for monitoring and setting our HVAC, load control devices, water heaters, exhaust fans and some lighting. We have been using ALC and Harris Integrated Solutions since 1995 and the Energy Management Service saves us hundreds of thousands of dollars each year. Since we have gone to a web-based program, now we can have access to the Energy Management Service with any internet connection available.

Energy Monitoring and Recording

"We use School Dude's Utility Direct to monitor and analyze all of our utilities. We can now more precisely compare school to school, month to month and even year to year usage, check for billing errors, and compose comprehensive reports and more accurately report usage to the State Energy Office. We can even identify areas where savings are possible by investigating bills that vary in usage and cost above a certain amount to see if there is a water leak, equipment operating after hours, etc.

The

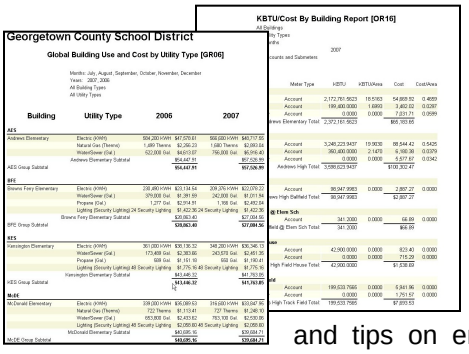




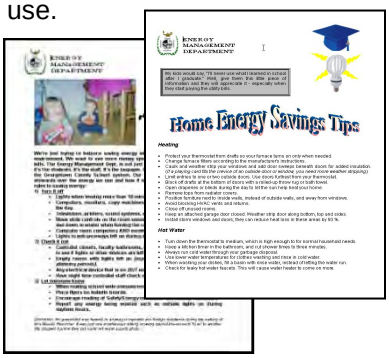
Monthly Energy Report

"Each month, school administrators are sent a report on their utilities. This way they can see their usage in all areas such as electric, natural gas, water, etc., and compare it to other schools. This information is vital in relaying progress or the need for improvements in energy consumption to faculty and staff. It can even encourage friendly competition between schools. They are divided into three different categories: high schools, middle schools, and elementary schools because each grade level has different levels of energy needs.

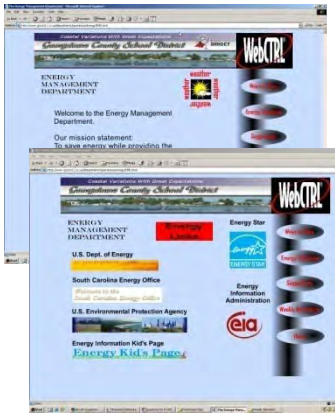
The Weekly Reminder



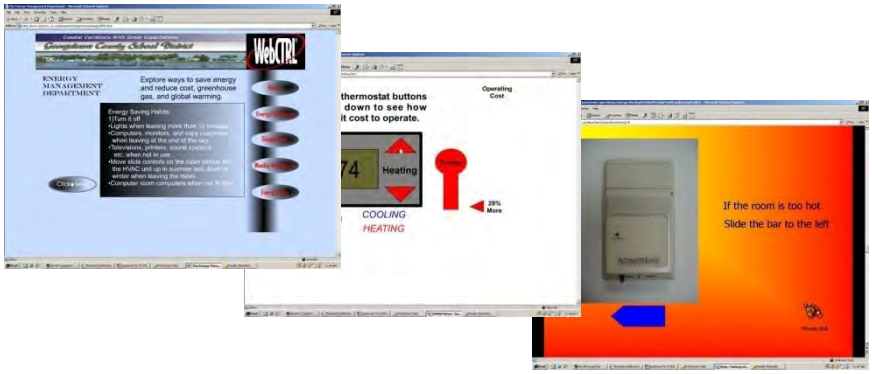
"Every Friday we send a lighthearted 'Weekly Reminder' through our district e-mail to every faculty member as a reminder to turn off unnecessary equipment before leaving on Fridays and holidays. These friendly reminders are filled with information and tips on energy for both school and home use.



The Energy Management Department Webpage



"There is an Energy Management Department webpage set up with energy information, directions on how to operate slide controllers in the classrooms, links to important energy websites, and even an interactive guide showing how much energy is saved by changing thermostat settings. There is also an anonymous link to report energy problems."

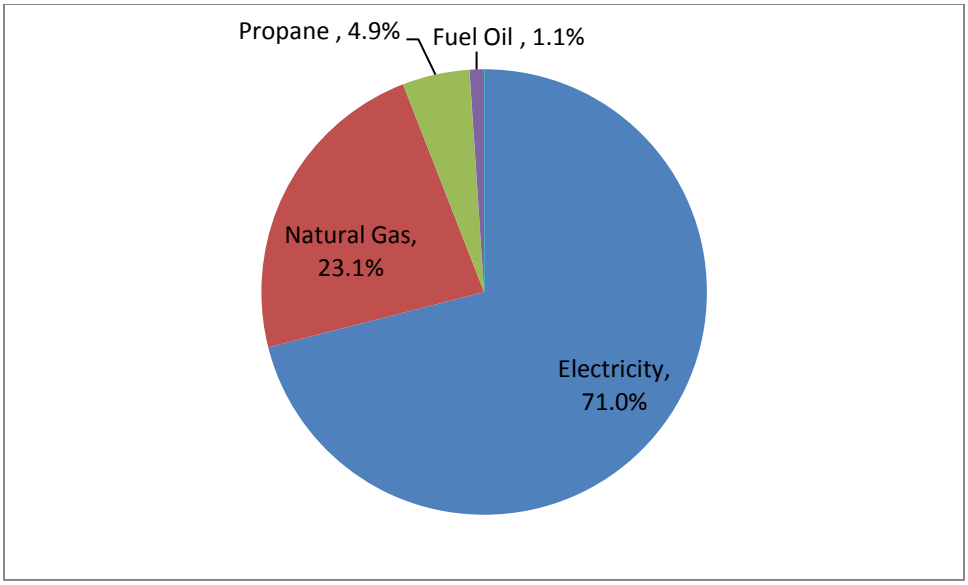


This report was prepared in cooperation with Tony Holcomb, Georgetown School District Energy Manager.

South Carolina State Agency Energy Use and Cost

State agencies' main source of energy is electricity, which represents more than 70 percent of the total (Figure 13). Natural gas usage is nearly one-fourth of the total while propane and fuel oil together constitute approximately six percent.

Figure 13. State Agency Percent of Total Energy Costs by Fuel Type 2008



Square footage for state agencies has fluctuated from 2004 to 2008 (Table 15) due to agency reorganizations, with an overall reduction of slightly more than one percent during this period. The South Carolina Military Department of the Adjutant General shed many facilities from 2004 to 2006, which significantly contributed to these fluctuations.

Total energy use for state agencies rose slightly between 2004 and 2008, while total energy cost rose by more than 20 percent, and energy cost per square foot rose by more than 20 percent. State agencies were able to reduce their energy use per square foot by a little more than one percent through their energy conservation efforts.

Table 15. State Agencies - Percent Changes 2004-2008

Square Footage	Total Energy Cost ($)	Total Energy Use (kBtu)	Energy Cost per Square Foot ($)	Energy Use per Square Foot (kBtu)
-1.05%	20.56%	-0.31%	20.53%	-1.07%

Table 16 and the charts following it show year to year changes for state agencies for the period from 2004 to 2008 for the following categories:

- Conditioned square footage (Figure 14)
- Total energy costs (Figure 15)
- Total energy use (Figure 16)
- Energy cost per square foot (Figure 17)
- Energy use per square foot (Figure 18)

Square footage decreased slightly, from 24.7 million in 2004 to 24.5 million in 2008, while total energy use increased slightly from 266 million kBtus to 266.5 million kBtus. Total energy cost per square foot rose from $1.71 in 2004 to $2.05 in 2008, and total energy cost increased from nearly $40 million to almost $48 million. State agencies were able to reduce their energy use per square foot from 115.7 kBtus/sf in 2004 to 115 kBtus/sf in 2008 through their energy conservation efforts.

Table 16. State Agency Energy Statistics 2004-2008

Fiscal Year	Square Footage (millions)	Total Cost ($millions)	Cost $/Sq. Ft.	Total Use kBtus (millions)	Use kBtu)/Sq. Ft.
2004	24.7	$39.8	$1.70	2,674	116.3
2005	23.8	$40.8	$1.81	2,634	118.0
2006	23.9	$45.4	$2.01	2,619	117.2
2007	24.4	$46.1	$1.97	2,681	115.9
2008	24.5	$48.0	$2.05	2,665	115.0

Figure 14. State Agency Total Square Footage 2004-2008

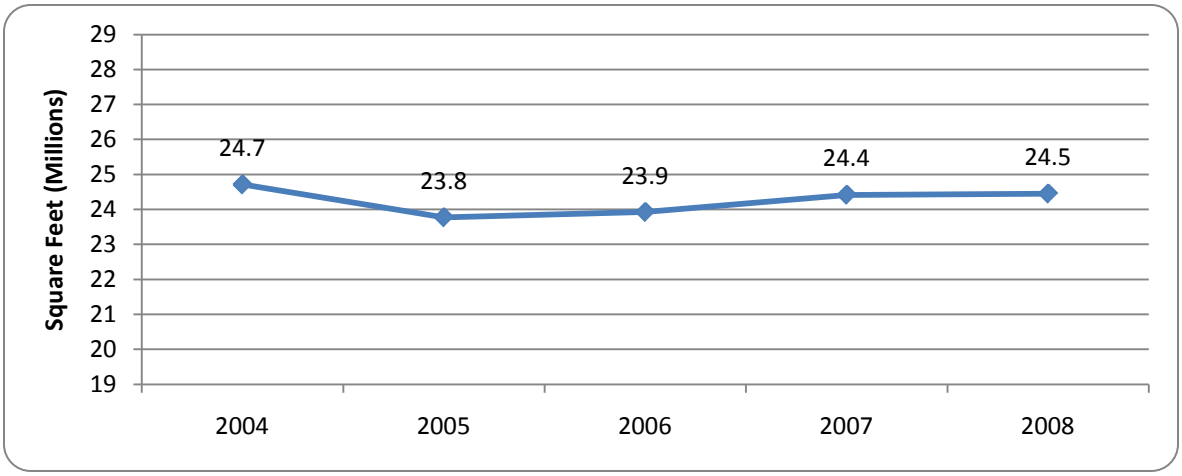


Figure 15. State Agency Total Cost 2004-2008

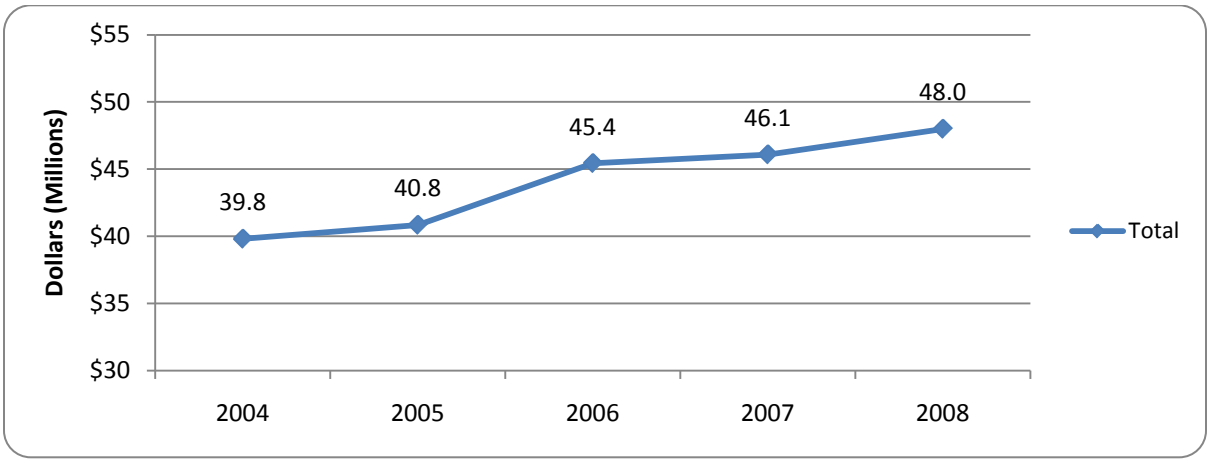


Figure 16. State Agency Total Use 2004-2008

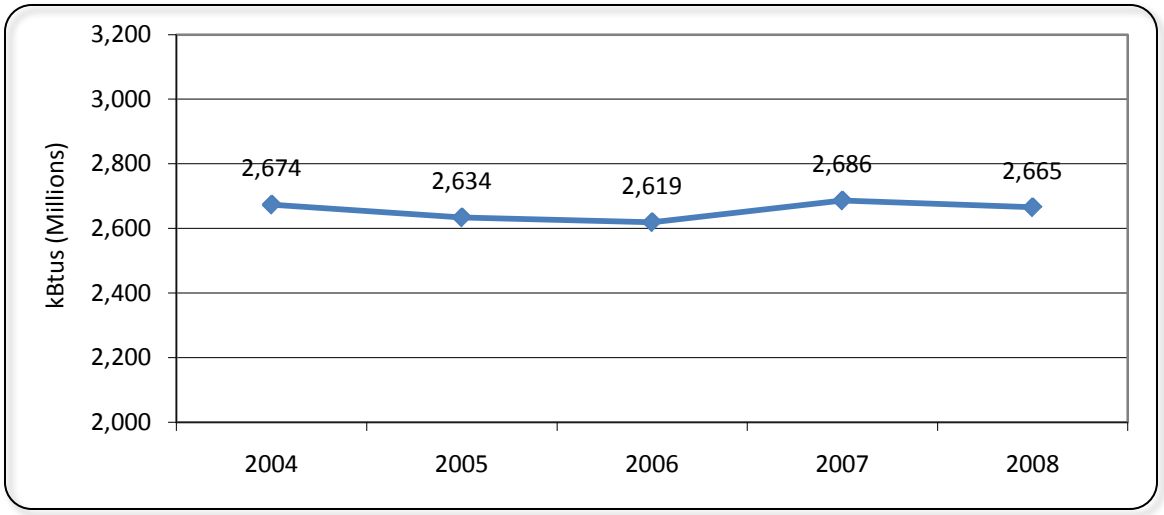


Figure 17. State Agency Energy Cost per Square Foot 2004-2008

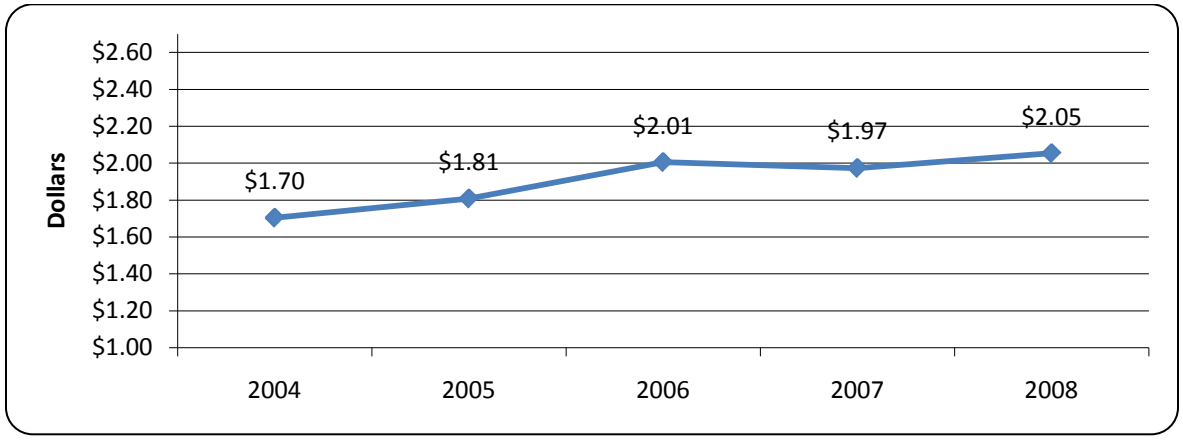
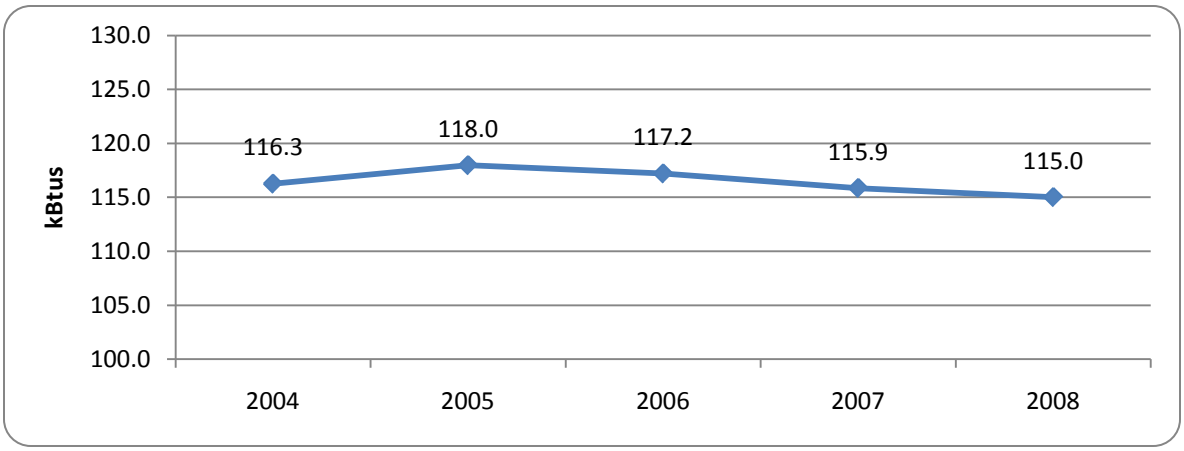


Figure 18. State Agency Energy Use per Square Foot 2004-2008



There are wide variations among building types and uses for the state agency organization type. For example, National Guard (The South Carolina Military Department of the Adjutant General) armories have, on average, lower use and cost per square foot because they are used mostly on weekends and only some weeks during the year. Other agencies, such as the South Carolina Department of Corrections, the South Carolina Department of Mental Health, and the South Carolina School for the Deaf and Blind operate 24 hours a day, seven days a week. Such variations are reflected in Tables 17 and 18 below, showing energy cost and use per square foot for state agencies.

Table 17. State Agency Energy Use (kBtu) per Square Foot 2004-2008 (Sorted ascending by 2008 data)

Organization	**2004**	**2005**	**2006**	**2007**	**2008**
SC National Guard (The South Carolina Military Department of the Adjutant General)	41.2	31.1	27.9	28.3	29.8
Commerce, Department of, Public Railways	53.0	52.7	43.6	39.5	32.9
SC Forestry Commission	32.6	30.6	35.3	35.3	34.7
SC Sea Grant Consortium	36.7	35.8	37.2	49.9	39.9
Patriots Point Development Authority	38.6	35.4	35.3	38.3	40.3
Vocational Rehabilitation, Department of	52.7	52.2	51.8	51.5	49.2
Health and Environment Control, Department of	46.9	57.0	47.4	54.7	55.8
John De La Howe School	56.6	50.3	55.5	56.3	58.3
Old Exchange Building	40.9	43.2	45.7	56.9	60.4
Labor, Licensing and Regulations, Department of	64.4	66.0	72.4	67.3	63.8
Employment Security Commission	77.9	69.9	68.0	68.6	67.4
Wil Lou Gray Opportunity School	86.9	84.2	80.4	66.8	68.2
Natural Resources, Department of	66.0	67.0	67.7	69.6	72.3
Disabilities & Special Needs, Department of	89.1	83.8	79.3	75.5	74.2
Motor Vehicles, Department of	N/A	N/A	N/A	N/A	76.4
Juvenile Justice, Department of	60.1	70.0	74.4	77.4	77.6
Parks, Recreation & Tourism, Department of	83.0	88.3	76.8	84.5	78.2
Public Safety, Department of	74.2	82.3	88.9	79.1	83.7
SC Arts Commission	115.0	102.2	87.5	86.4	85.4
SC Educational Television	93.5	97.3	95.5	97.1	95.8
Transportation, Department of	111.0	112.6	111.9	110.6	109.9
Santee Cooper	116.8	106.7	110.7	111.4	112.0
SC Governor's School for Science and Mathematics	N/A	N/A	N/A	N/A	114.7
Mental Health, Department of	136.1	130.0	122.3	123.4	120.3
SC School for the Deaf and Blind	163.7	163.7	169.0	169.7	142.2
General Services	132.9	134.7	140.1	141.1	148.9
SC Governor's School for the Arts and Humanities	N/A	N/A	N/A	N/A	152.2
Corrections, Department of	164.6	162.4	161.8	157.9	155.3
SC State Ports Authority	126.9	134.9	136.7	145.0	163.6
SC Law Enforcement Division	207.1	156.1	178.2	175.7	171.3
Commerce, Department of, Aeronautics	219.9	221.6	221.6	199.2	230.6

Division					
Agriculture, Department of	284.5	275.1	266.6	272.7	295.7
Criminal Justice Academy	N/A	N/A	N/A	N/A	N/A
Totals	116.3	118.0	117.2	115.9	115.0

Table 18. State Agency Energy Cost per Square Foot 2004-2008 (Sorted ascending by 2008 data)

Organization	**2004**	**2005**	**2006**	**2007**	**2008**
SC National Guard (The South Carolina Military Department of the Adjutant General)	$0.80	$0.65	$0.68	$0.66	$0.72
Patriots Point Development Authority	$0.84	$0.83	$0.92	$0.98	$1.06
Commerce, Department of, Public Railways	$1.45	$1.43	$1.31	$1.21	$1.09
SC Forestry Commission	$0.87	$0.91	$1.07	$1.09	$1.14
Wil Lou Gray Opportunity School	$1.03	$1.10	$1.23	$1.07	$1.18
Vocational Rehabilitation, Department of	$1.17	$1.18	$1.24	$1.28	$1.29
Santee Cooper	$1.37	$1.25	$1.30	$1.30	$1.30
Health and Environment Control, Department of	$1.08	$1.32	$1.07	$1.30	$1.37
SC Sea Grant Consortium	$1.06	$1.06	$1.16	$1.37	$1.37
Disabilities & Special Needs, Department of	$1.53	$1.42	$1.53	$1.48	$1.50
Old Exchange Building	$0.90	$0.97	$1.04	$1.57	$1.59
John De La Howe School	$1.38	$1.27	$1.19	$1.56	$1.70
Juvenile Justice, Department of	$1.37	$1.29	$1.61	$1.59	$1.70
Transportation, Department of	$1.43	$1.52	$1.69	$1.66	$1.72
Labor, Licensing and Regulations, Department of	$1.52	$1.59	$1.79	$1.83	$1.73
Natural Resources, Department of	$1.45	$1.55	$1.62	$1.69	$1.81
SC Educational Television	$1.45	$1.57	$1.65	$1.86	$1.84
Employment Security Commission	$1.73	$1.69	$1.75	$1.79	$1.89
SC Governor's School for Science and Mathematics	N/A	N/A	N/A	N/A	$1.98
Mental Health, Department of	$1.73	$1.76	$1.96	$1.95	$2.06
Public Safety, Department of	$1.71	$1.98	$2.19	$2.13	$2.09
SC Arts Commission	$2.06	$1.97	$2.07	$2.08	$2.15
SC School for the Deaf and Blind	$1.84	$1.84	$2.32	$2.31	$2.16
Motor Vehicles, Department of	N/A	N/A	N/A	N/A	$2.19
Parks, Recreation & Tourism, Department of	$1.95	$1.91	$1.98	$2.18	$2.24
SC Governor's School for the Arts and Humanities	N/A	N/A	N/A	N/A	$2.41
General Services	$1.71	$1.88	$2.28	$2.27	$2.45
Corrections, Department of	$2.24	$2.38	$2.56	$2.44	$2.52
SC Law Enforcement Division	$3.50	$2.66	$3.23	$3.36	$3.28
SC State Ports Authority	$2.50	$2.88	$3.08	$3.08	$3.69
Commerce, Department of, Aeronautics Division	$4.32	$4.13	$5.04	$4.36	$5.46
Agriculture, Department of	$7.12	$7.16	$7.49	$7.66	$8.33
Criminal Justice Academy	N/A	N/A	N/A	N/A	N/A
State Agency Average	$1.70	$1.81	$2.01	$1.97	$2.05

Notes:

1. All building types reported for the South Carolina Department of Education fell into the "maintenance" category and were not included in analysis.
2. South Carolina Governor's Schools began reporting in 2008.
3. State Fleet Management was contained within Statewide Building Services prior to 2006. Most of State Fleet Management's space in considered "unconditioned;" therefore, per square foot data has not been included.
4. Highway Patrol Buildings moved from Statewide Building Services to Department of Public Safety in 2007.
5. Department of Motor Vehicles buildings were reported under General Services prior to 2008.
6. Santee Cooper supplies its own energy; costs are estimated.

Note: Due to missing or insufficient data, energy use and consumption was either partially or completely estimated for the following agencies/years:

2004: Old Exchange Building, SC Department of Juvenile Justice, SC Department of Natural Resources, SC Department of Transportation
2005: SC Department of Juvenile Justice, SC Department of Natural Resources, SC Department of Transportation
2006: SC Department of Transportation
2007: SC Department of Transportation
2008: SC Governor's School for Science and Mathematics, SC Military Department

Success Story: **Waccamaw Community Mental Health Center**

The South Carolina Department of Mental Health invested $17,000 in an energy management system at Waccamaw Community Mental Health Center and received a return of 157 percent in energy cost savings during the first year of operation.

Located in Conway, the Waccamaw Community Mental Health Center provides out-patient clinical services at a 33,000 square foot facility built in 1993. The HVAC system has 25 air source split system heat pumps that provide 137 tons of air conditioning. Fourteen of the units were originally controlled by a thermostat in each room that adjusted the air flow through grilles to maintain the desired temperature setting. Due to design and installation problems, compounded by occupants tampering with the grilles, the system failed to provide adequate temperature control. For many years, building management ran the system "24/7" in order to improve temperature control.

In early 2006, Control Management, Inc. installed a Novar Energy Management System to control all of the HVAC units. The Center also closed up exterior openings above the ceilings and repaired leaking ductwork. In the first twelve months of operation, the run time for the HVAC units was reduced by 70 percent, and the annual kWh use was reduced by 34 percent. The reduction in kWh consumption yielded $27,000 in avoided costs, making the simple payback period for the system less than one year.

Waccamaw is one of seventeen community mental health centers that provide community-based, outpatient services throughout South Carolina. Each center has a main clinic in its service area, and most centers have satellite offices that serve smaller communities. To meet the challenge of maintaining facilities in over 30 locations, the Department of Mental Health has developed standard operating procedures. All of the centers use the procedures as a basis for procuring and overseeing HVAC preventive maintenance contracts for their facilities.

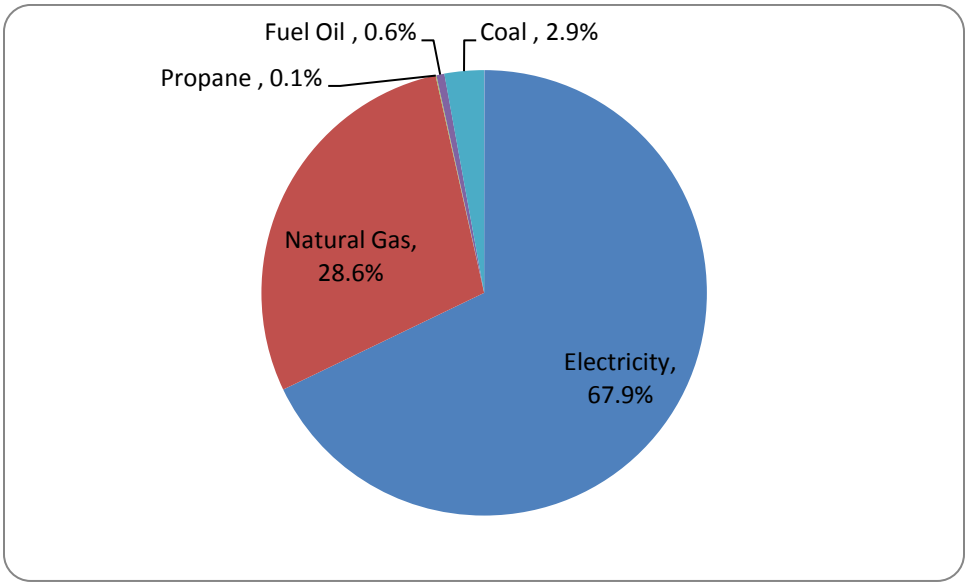
In addition to the community centers, the Department of Mental Health manages specialized clinics and five inpatient facilities in Columbia and two inpatient facilities in Anderson. The Department's Office of Physical Plant Services employs 70 people in building services and seven in engineering services. Utilities consumption and costs are tracked using Utility Direct. To fund energy improvements, Jim Berry, Director of Physical Plant Services, reports they look for opportunities to upgrade HVAC systems, lighting, and thermal barriers when facilities are renovated.

This report was prepared in cooperation with James R. Berry, Director, Office of Physical Plant Services, Department of Mental Health, and J. Blaine Walker, Energy Management Consultant

South Carolina Residential Colleges Energy Use and Cost

Residential colleges' main source of energy is electricity which represents approximately two-thirds of the total (Figure 18). Of the four building types included in this report, residential colleges obtain the largest percentage of total energy from natural gas, which is significant because electricity tends to be the most expensive form of energy. Natural gas usage is nearly thirty percent of the total while fuel oil and propane constitute less than one percent combined. Clemson University uses coal to generate some of its energy and this represents almost three percent of the total for all 12 residential colleges.

Figure 18 Residential Colleges Percent of Total Energy Costs by Fuel Type 2008



Square footage for residential colleges and universities grew by more than 13 percent from 2004 to 2008, and total energy use increase by slightly more than six percent (Table 19). Total energy cost increased by almost 39 percent, while energy cost per square foot soared by nearly 30 percent. Overall, residential colleges and universities were able to hold their energy use per square foot roughly even with 2004 levels by 2008.

Table 19. Residential Colleges and Universities - Percent Changes 2004-2008

Square Footage	Total Energy Cost ($)	Total Energy Use (kBtu)	Energy Cost per Square Foot ($)	Energy Use per Square Foot (kBtu)
13.27%	38.80%	6.39%	29.88%	-0.06%

Table 20 and the charts following it show year to year changes for residential colleges and universities for the period from 2004 to 2008 for the following categories:

- Conditioned square footage (Figure 18)
- Total energy costs (Figure 19)
- Total energy use (Figure 20)
- Energy cost per square foot (Figure 21)
- Energy use per square foot (Figure 22)

Square footage increased from 36 million to 40.7 million, while total energy use rose from nearly 413 million kBtus to more than 439 million kBtus. Total energy cost per square foot was the highest among all organization types, and rose from $1.52 in 2004 to $1.97 in 2008. Total energy cost increased from $48.1 million to $66.7 million. Residential colleges and universities were able to keep their energy use per square foot in 2008 roughly even with that of 2004.

Table 20. Residential Colleges and Universities Energy Statistics 2004-2008

Fiscal Year	Square Footage (millions)	Total Cost ($millions)	Cost/Sq. Ft.	Total Use kBtus (millions)	Use kBtus/ Sq. Ft.
2004	36.0	$48.1	$1.52	4,128	131.2
2005	37.0	$53.8	$1.67	4,247	132.7
2006	37.8	$62.1	$1.88	4,340	132.3
2007	38.4	$61.7	$1.86	4,407	134.1
2008	40.7	$66.7	$1.97	4,392	131.1

Figure 20. Residential Colleges Total Square Footage 2004-2008

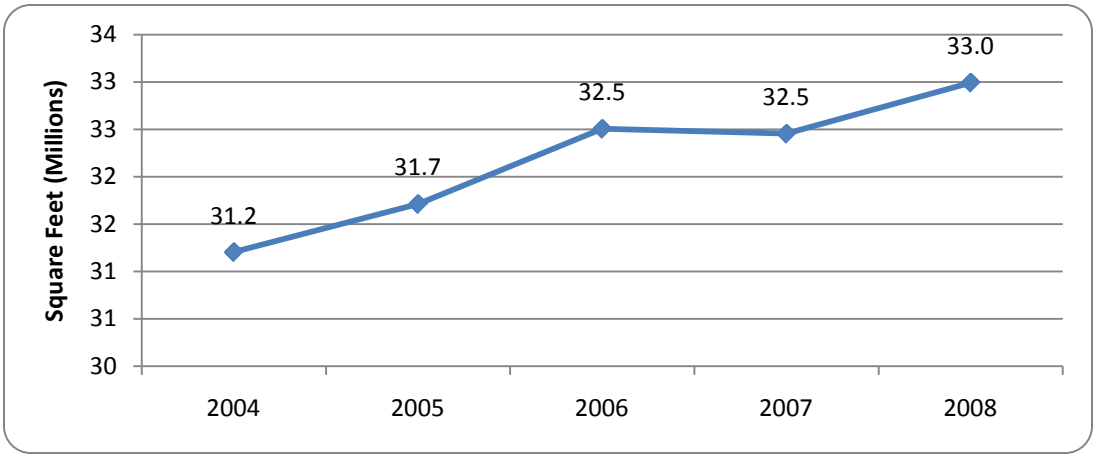


Figure 21. Residential Colleges Total Cost 2004-2008

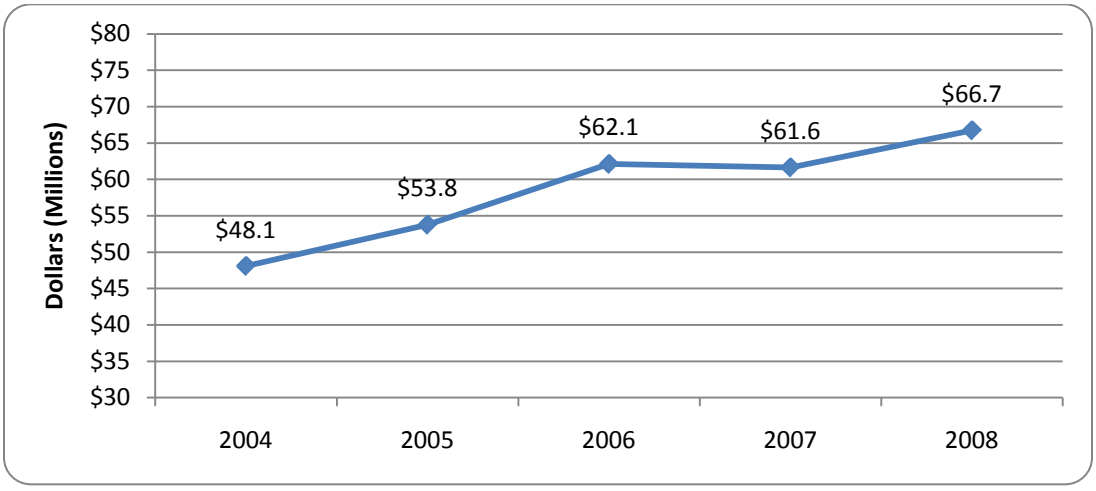


Figure 22. Residential Colleges Total Use 2004-2008

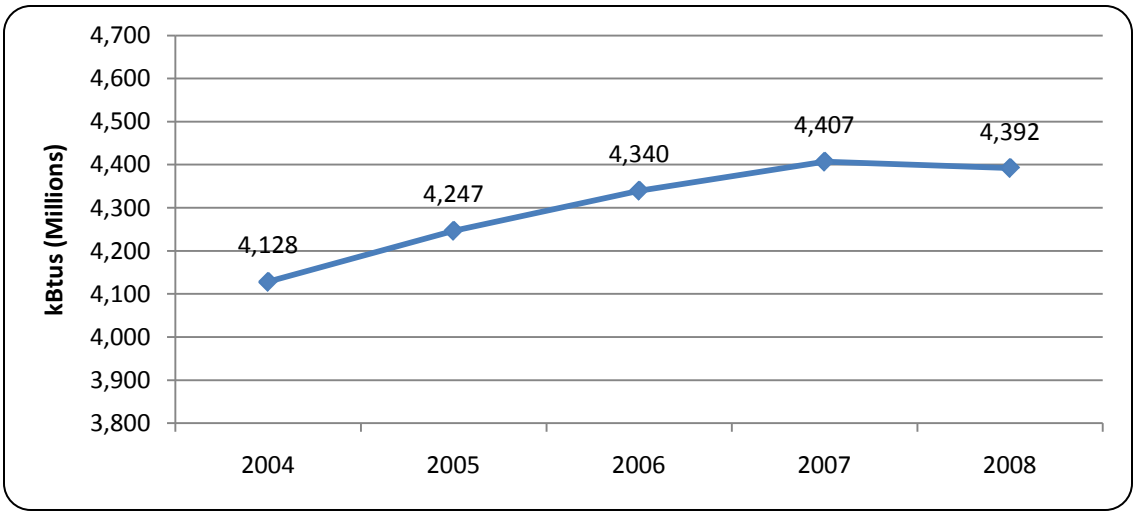


Figure 23. Residential Colleges Energy Cost per Square Foot 2004-2008

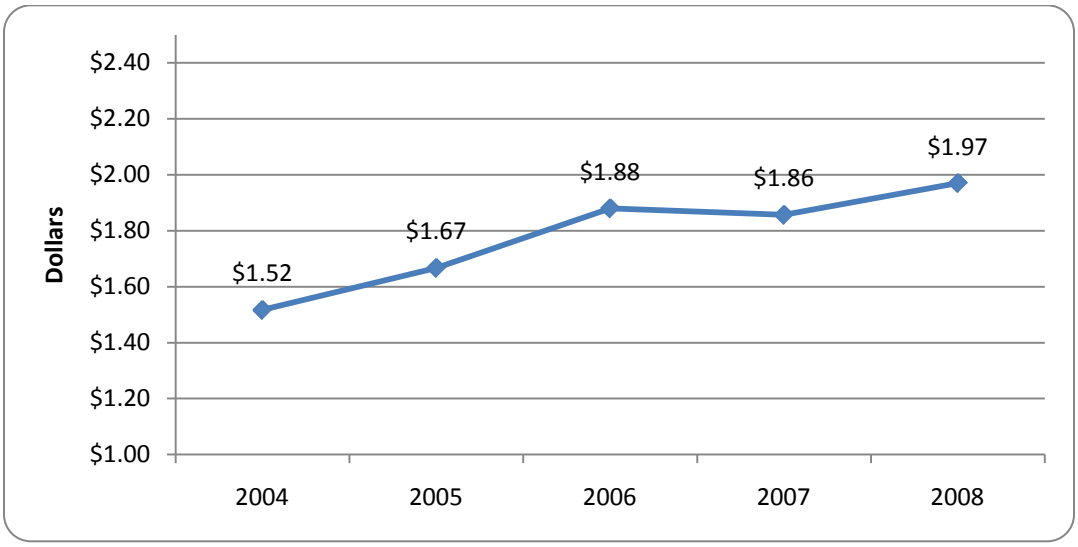
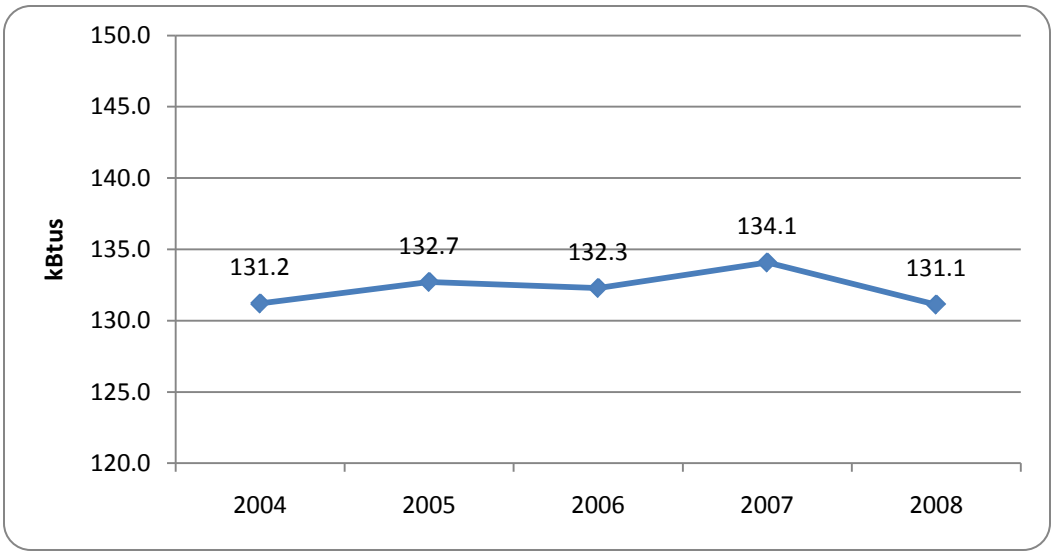


Figure 24. Residential Colleges Energy Use per Square Foot 2004-2008



The following tables present the use and cost per square foot for residential colleges, ranking them from lowest to highest cost per square foot (Table 21) and lowest to highest cost per square foot (Table 22) in 2008. (Medical University of South Carolina does not have student housing, but its round-the-clock clinical functions make its energy use patterns more similar to those of residential colleges than to non-residential colleges, accounting for its inclusion in this group).

Table 21. Residential College Use (in kBtus) per Square Foot 2004-2008 (Sorted ascending by 2008 data)

Organization	2004	2005	2006	2007	2008
Denmark Technical College	58.0	53.5	54.8	53.7	55.0
USC - Aiken	51.9	57.0	53.8	54.5	56.3
Coastal Carolina University	54.0	52.2	53.4	54.6	56.4
Lander University	79.3	78.6	68.2	68.8	67.9
USC - Upstate	79.8	88.1	90.4	89.7	87.5
Francis Marion University	103.1	101.6	97.8	93.6	90.2
College of Charleston	130.6	124.1	102.3	100.9	99.8
Winthrop University	101.7	99.2	95.7	104.9	100.2
The Citadel	129.0	124.3	115.1	106.9	115.7
South Carolina State University	105.4	115.8	122.8	122.4	118.1
University of South Carolina - Columbia	138.5	140.2	129.0	128.4	125.0
Clemson University	148.2	155.0	164.9	161.9	157.0
Medical University of South Carolina	221.6	217.7	250.0	269.4	265.4
Average for Residential Colleges/Universities	131.2	132.7	132.3	134.1	131.1

Table 22. Residential College Cost per Square Foot 2004-2008 (Sorted ascending by 2008 data)

Organization	2004	2005	2006	2007	2008
Coastal Carolina University	$0.95	$1.02	$1.18	$1.15	$1.17
USC - Aiken	$0.97	$1.07	$1.15	$1.21	$1.21
Lander University	$1.08	$1.10	$1.16	$1.16	$1.23
Denmark Technical College	$1.18	$1.15	$1.31	$1.32	$1.31
Winthrop University	$1.13	$1.26	$1.21	$1.45	$1.39
Clemson University	$0.98	$1.12	$1.25	$1.45	$1.61
USC - Upstate	$1.16	$1.30	$1.47	$1.50	$1.62
South Carolina State University	$1.27	$1.41	$1.69	$1.67	$1.68
College of Charleston	$1.96	$2.18	$1.72	$1.71	$1.75
The Citadel	$1.58	$1.64	$1.90	$1.67	$1.87
University of South Carolina - Columbia	$1.60	$1.75	$1.98	$1.86	$2.02
Francis Marion University	$1.81	$1.91	$2.01	$1.97	$2.06
Medical University of South Carolina	$3.11	$3.31	$4.29	$3.92	$4.17
Average for Residential Colleges/Universities	$1.52	$1.67	$1.88	$1.86	$1.97

Note: Data for South Carolina State University was incomplete and therefore estimated for the 2004 – 2008 period.

Success Story: Coastal Carolina University
By Anne-Marie D'Onofrio, Class of 2007
Photos by Courtney Burge

Although Coastal Carolina University has been a member of the South Carolina Sustainable Universities Initiative since 2000, it has become even more of a leader in environmental stewardship in the community after October 25, 2005, the third annual Campus Sustainability Day and the date on which the Coastal Carolina University Center for Campus and Community Sustainability was established.

With Coastal's growth came the renovation of the Coastal Science Center, located in the Atlantic Center for Business and Industry, across U.S. Highway 501 from the main campus. This building was outfitted with several energy efficiency improvements with a grant from Santee Cooper. The six energy improvements for the Science Center totaled $216,455 and generated an estimated annual savings of $76,400, with payback in less than three years.

A Direct Digital Control (DDC) Energy Management System is used in the Science Center to provide system-wide adjustments to set points. The DDC is connected to the campus-wide system and allows for close monitoring by facilities engineers.

Classrooms are all outfitted with occupancy sensors which detect infrared and ultrasonic frequencies. The sensors are used to control lighting and are connected to the DDC energy management system, and save energy by reducing burn time of lights by as much as 35 percent.

In addition to the occupancy sensors, T-5 fluorescent lamps with refractor lenses are used, rather than the traditional T-8 lighting. Refractors provide even light distribution throughout a room and help reduce energy usage up to 28 percent. The T-5 lamps radiate less heat than the T-8 and save money on air conditioning costs.

The entire heating, ventilation and air conditioning (HVAC) system is state-of-the-art and uses an air-to-air energy recovery system, or enthalpy wheel. This is essentially an air recycling system which takes air in the building, already at the desired temperature, and puts it through a pre-conditioning unit. The "recycled" air helps get fresh air coming into the building closer to the desired temperature while using less energy to do so. The inflow and outflow pass through a heat exchanger in counter flow directions, thus creating a more even temperature. Using this system can reduce the cooling demand up to 32 percent and the heating demand up to 38 percent. This system allows downsizing of traditional HVAC systems, saving money from the moment it is installed.

The building also features variable frequency drives in place of conventional on/off fans. The drives reduce electrical energy use by approximately 80 percent by adjusting for variable air volume. And finally,

a demand control ventilation system is used in the Science Center, comparing carbon dioxide levels of inside air to the levels of outside air and introducing fresh air as needed. This allows for a 35 percent decrease in outside air, saving fan energy and heating and cooling costs.

In addition to the energy efficiency improvements at the Coastal Science Center, Kearns Hall and other locations, the University's main campus features the state's first solar green power site – a solar pavilion demonstration. The pavilion is used as a bus stop by students, and was dedicated on Nov. 1, 2006. It is the first solar photovoltaic project constructed at a South Carolina public university. Solar panels, generating 16 kilowatts of power and measuring 22 by 27 feet, were installed on the four open-air structures. Like the improvements to the Coastal Science Center, this project was funded by a Santee Cooper grant of $250,000. Displays of solar energy being generated can be seen on a monitor in the lobby of the R. Cathcart Smith Science Center.

According to Dan Abel, associate professor of marine science and Director of the CCU Campus and Community Sustainability Initiative, Coastal still has room to improve. "[Our challenges are] monetary resources, personnel, indifference, ignorance about the severity of the problem, plus a disconnect between the global climate crisis and our responsibility to act locally to effect changes globally," said Abel.

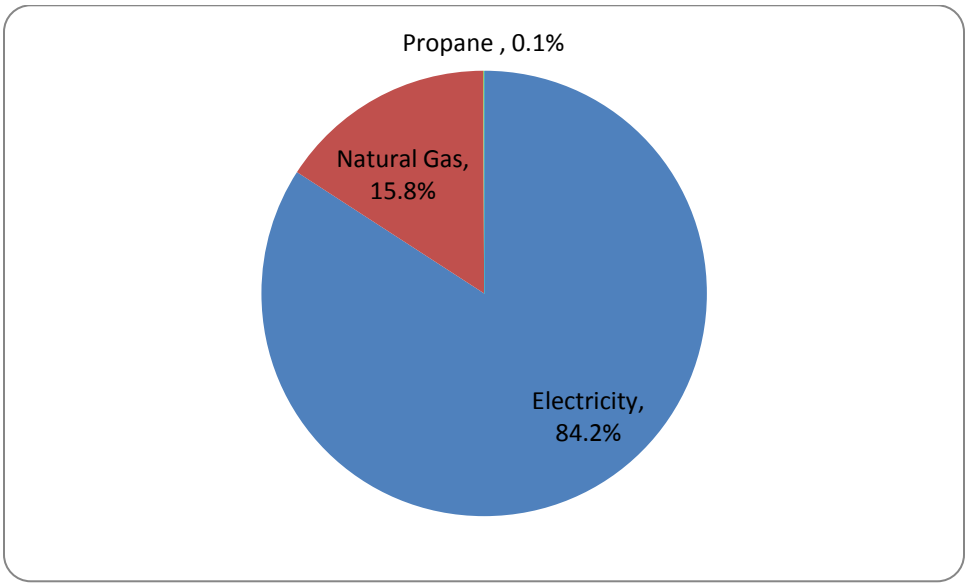
Rein Mungo, Director of University Projects and Planning, is in charge of monitoring energy use and costs and does this with a spreadsheet system that allow him to compare the present year with the previous, as well as the present month with the previous.


GreenPower SOLAR Pavilion
Be a part of improving our environment! Learn more at www.scgreenpower.com
A DEMONSTRATION PROJECT
SUN
1 Sunlight is absorbed by the four panels, one panel on each of the four Solar Pavilions
SOLAR PANELS
COMBINER/INVERTER
2 The energy from the panels flows to a combiner box and then to an inverter where it is converted from DC to AC current.
3 The current is then sent to a transformer and later to the Santee Cooper grid as Green Power.
TRANSFORMER
GRID
• This solar array is capable of generating 16 kilowatts of electricity (DC). This amount of power produced can supply enough electricity for about 100 computers.
• Each panel is composed of 20 photovoltaic (PV) modules. Each module measures about 30 in. X 60 in. and can generate 200 watts of electricity (DC).
• The solar cells use silicon-based semiconductor technology to change the sun's power into the electron flow which is electricity.
• The output is maximized at spring and fall equinox due to the tilt angle of the modules, and is also affected by temperatures of the equipment, humidity, haze and length of day.
Green Power is Generating a Positive Environmental Future in South Carolina
Electricity made from renewable resources like solar, wind and methane gas from decaying garbage are replenished naturally and minimize harm to the environment.
Santee Cooper's Green Power is generated from methane gas and the sun and:
• increases South Carolina's energy independence
• encourages the growing demand for renewable energy
• improves and preserves the environment for future generations.
When you choose to buy Green Power you increase the amount of clean, renewable electricity that is produced.
100% of the Green Power revenues are used to grow other renewable energy projects in South Carolina. Special thanks to Coastal Carolina University and the other Green Power Partners and customerss who made this possible.
GreenPower
COASTAL CAROLINA UNIVERSITY

South Carolina Non-residential College Energy Use and Cost

Community and technical colleges, along with two-year branches of the University of South Carolina, comprise the category of non-residential colleges and universities. Their main source of energy is electricity, which represents nearly 85 percent (Figure 22). This percentage is only slightly lower than for school districts. Natural gas usage is nearly 16 percent the total, while propane constitutes less than one percent.

Figure 25. Non-residential Colleges Percent of Total Energy Costs by Fuel Type 2008



Square footage for non-residential colleges and universities grew by nearly 16 percent from 2004 to 2008 (Table 23). Total energy cost increased by more than 39 percent, and energy cost per square foot increased by more than 20 percent. Overall they were able to reduce energy use per square foot by 0.6 percent between 2004 and 2008.

Non-residential colleges often face special challenges in pursuing reductions in energy use per square foot. As demand for their class offerings grows, many of these colleges extend their operating hours during nights, weekends, and break periods, resulting in increased energy use for the same square footage. Additionally, over the last decade many of these colleges have added energy-intensive facilities such as laboratories and manufacturing training facilities like the Southeastern Institute of Manufacturing and Technology at Florence-Darlington Technical College. These efforts enhance the missions of these colleges to provide technical training to students and industry, but also require energy managers to be all the more vigilant in finding opportunities for saving energy.

Table 23. Non-residential Public Colleges and Universities - Percent Changes 2004-2008

Square Footage	Total Energy Cost ($)	Total Energy Use (kBtu)	Energy Cost per Square Foot ($)	Energy Use per Square Foot (kBtu)
15.27%	39.18%	15.22%	20.09%	-0.60%

Table 24 and the charts following it show year to year changes for non-residential colleges and universities for the period from 2004 to 2008 for the following categories:

- Conditioned square footage (Figure 26)
- Total energy costs (Figure 27)
- Total energy use (Figure 28)
- Energy cost per square foot (Figure 29)
- Energy use per square foot (Figure 30)

Square footage increased from 7.7 million to 8.3 million, while total energy use rose from nearly 555 million kBtus to almost 592 million kBtus. Even more important for public budgets, total energy cost per square foot rose from $1.30 in 2004 to $1.51 in 2008, and total energy cost increased from $10 million to $12.4 million. Energy use per square foot for non-residential colleges and universities increased slightly from 72.0 kBtus per square foot to 72.6 kBtus per square foot. This increase is likely due to were able to reduce their energy use per square foot slightly from 65.3 kBtus/sf to 65.0 kBtus/sf through their energy conservation efforts.

Table 24. Non-residential Colleges and Universities Energy Statistics 2004-2008

Fiscal Year	Total Square Footage (millions)	Total Cost ($millions)	Cost/Square Foot	Total Use kBtus (millions)	Use kBtus/ Sq. Ft.
2004	7.7	$10.0	$1.30	554.7	72.0
2005	7.8	$10.2	$1.31	552.1	71.5
2006	7.9	$11.6	$1.48	569.4	72.6
2007	8.3	$12.4	$1.51	591.9	72.6
2008	8.7	$13.7	$1.59	625.1	72.8

Figure 26. Non-residential Colleges Total Square Feet 2004-2008

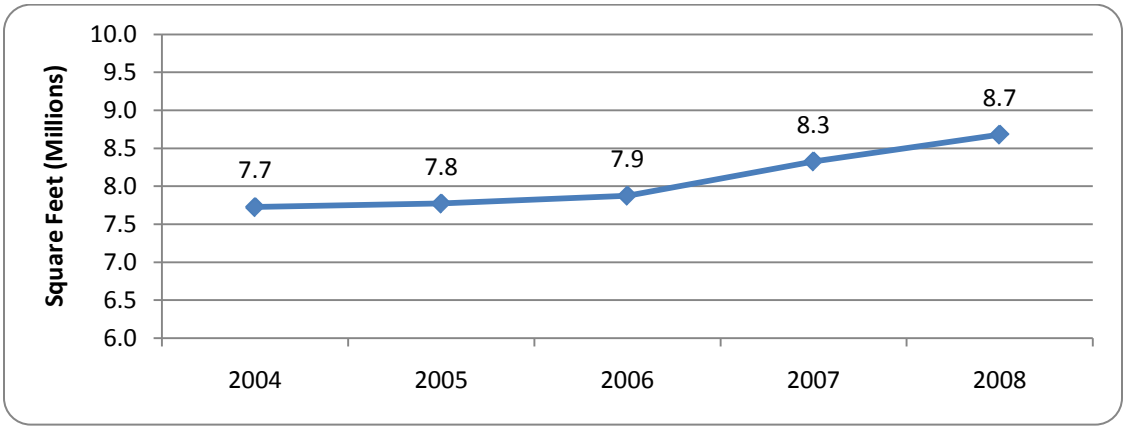


Figure 27. Non-residential Colleges Total Cost 2004-2008

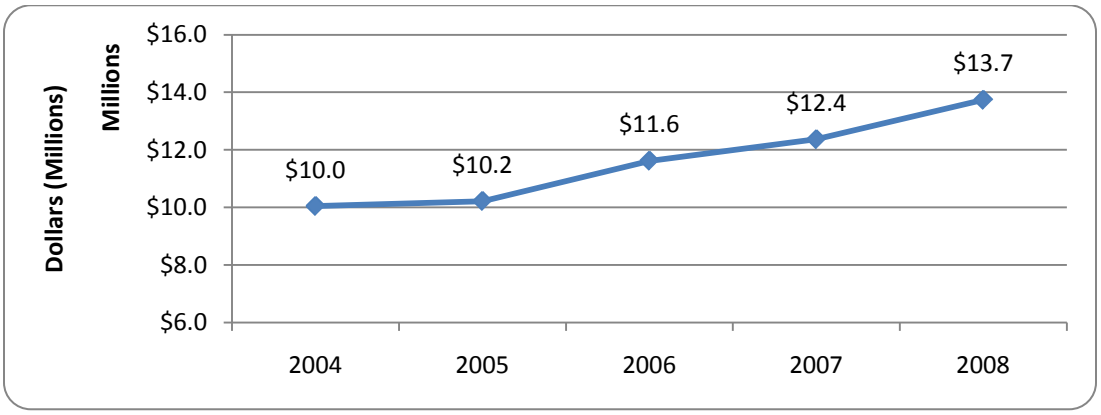


Figure 28. Non-residential Colleges Total Use 2004-2008

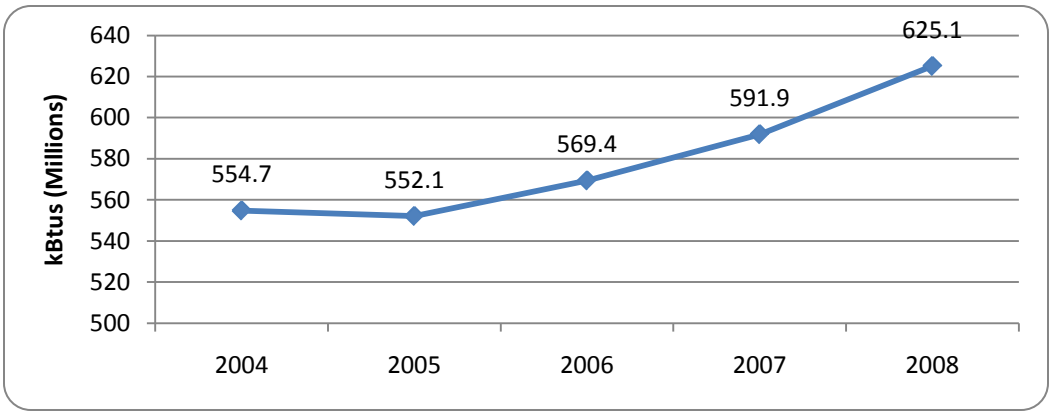


Figure 29. Non-residential Colleges Energy Cost per Square Foot 2004-2008

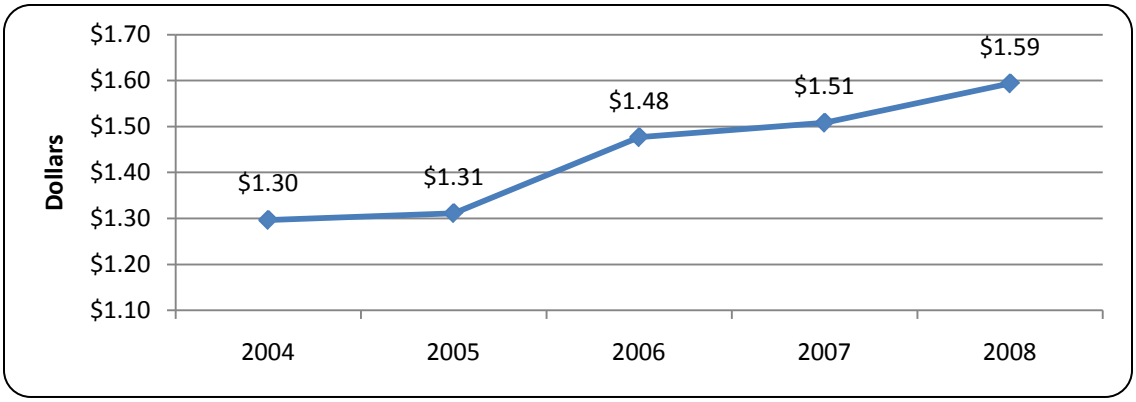
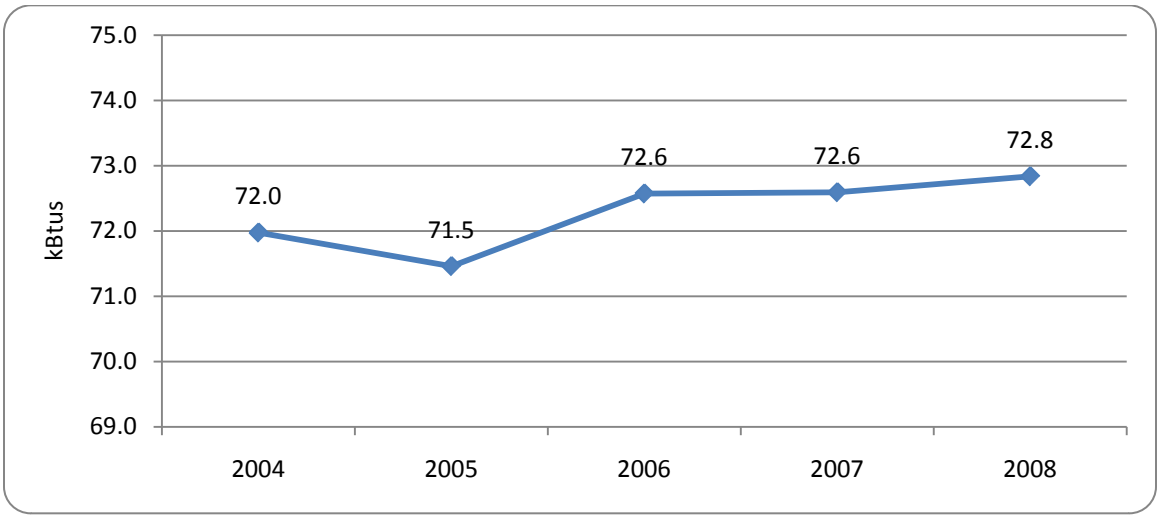


Figure 30. Non-residential Colleges Energy Use (kBtu) per Square Foot 2004-2008



The following tables present the use and cost per square foot for non-residential colleges, ranking them from lowest to highest use per square foot (Table 25) and lowest to highest cost per square foot (Table 26) in 2008.

Table 25. Non-residential Colleges Use per Square Foot 2004-2008 (Sorted ascending by 2008 data)

Organization	2004	2005	2006	2007	2008
USC – Salkehatchie	34.2	33.3	33.0	32.5	33.3
Williamsburg Technical College	30.0	30.1	32.4	31.3	34.6
USC – Union	35.2	35.2	42.9	41.1	41.7
Central Carolina Technical College	53.0	51.3	49.0	48.6	50.9
Northeastern Technical College	44.8	47.3	49.1	49.9	51.5
USC – Beaufort	57.5	48.9	56.7	51.1	54.7
Spartanburg Community College	64.7	61.3	62.8	59.1	56.7
Piedmont Technical College	50.2	47.7	59.5	61.0	62.6
USC – Sumter	75.1	68.2	64.3	65.4	63.1
Greenville Technical College	68.4	68.0	69.3	70.1	70.4
Technical College of the Lowcountry	72.2	70.3	65.1	72.3	72.5
Orangeburg-Calhoun Technical College	71.2	74.1	74.5	76.1	76.4
Midlands Technical College	81.8	85.9	87.8	82.7	76.9
Trident Technical College	79.8	76.2	68.6	77.3	81.2
Tri-County Technical College	78.6	78.6	81.3	78.0	81.5
York Technical College	80.3	80.1	86.0	81.5	82.0
USC – Lancaster	92.6	86.0	84.6	82.8	84.6
Horry-Georgetown Technical College	85.7	79.9	82.0	91.5	89.2
Aiken Technical College	75.9	99.6	103.9	95.6	91.4
Florence-Darlington Technical College	100.4	100.9	102.3	99.4	93.5
Average for Non-residential Colleges and Universities	72.0	71.5	72.6	72.6	72.8

Table 26. Non-residential Colleges Cost per Square Foot 2004-2008 (Sorted ascending by 2008 data)

Organization	2004	2005	2006	2007	2008
USC - Union	$0.91	$0.94	$1.13	$1.02	$1.00
Williamsburg Technical College	$0.79	$0.79	$0.97	$0.91	$1.03
Spartanburg Community College	$0.96	$0.94	$1.08	$1.04	$1.05
USC - Salkehatchie	$0.95	$0.97	$1.02	$1.04	$1.08
Piedmont Technical College	$1.00	$0.98	$1.09	$1.09	$1.16
Northeastern Technical College	$0.89	$0.95	$1.03	$1.14	$1.22
USC - Sumter	$1.30	$1.21	$1.34	$1.38	$1.32
Central Carolina Technical College	$1.19	$1.15	$1.26	$1.30	$1.39
Greenville Technical College	$1.14	$1.16	$1.31	$1.35	$1.43
USC - Beaufort	$1.51	$1.25	$1.49	$1.38	$1.48
Tri-County Technical College	$1.29	$1.29	$1.41	$1.37	$1.49
USC - Lancaster	$1.49	$1.36	$1.55	$1.41	$1.58
Orangeburg-Calhoun Technical College	$1.21	$1.26	$1.33	$1.51	$1.66
York Technical College	$1.51	$1.62	$1.79	$1.77	$1.72
Midlands Technical College	$1.48	$1.59	$1.82	$1.74	$1.84
Horry-Georgetown Technical College	$1.37	$1.54	$1.76	$1.97	$1.91
Aiken Technical College	$1.42	$1.61	$1.85	$1.78	$1.93

Technical College of the Lowcountry	$1.65	$1.63	$1.71	$1.84	$1.94
Trident Technical College	$1.48	$1.41	$1.55	$1.74	$1.96
Florence-Darlington Technical College	$1.73	$1.71	$2.04	$2.06	$2.06
Average for Non-residential Colleges and Universities	$1.30	$1.31	$1.48	$1.51	$1.59

Note: Due to missing or insufficient data, energy use and consumption was either partially or completely estimated for the following school districts/years:

2004: Williamsburg Technical College
2006:
2007:
2008:

Conclusions

Energy costs for public facilities increased more than 30 percent from 2004 to 2008. This rapid cost trend is expected to continue into the future. The most effective way to mitigate the impact of these increases is to aggressively pursue energy efficiency improvements that will reduce energy use per square foot.

The South Carolina General Assembly passed H4766 in 2008. This legislation requires school districts, public colleges and universities, and state agencies to submit an energy conservation plan to the South Carolina Energy Office (SCEO), with a goal to reduce energy consumption (measured in use per square foot) by at least one percent annually for five consecutive years beginning July 1, 2008. The plan must also have a goal of ultimately reducing energy consumption for buildings in use on July 1, 2008, by 20 percent by July 1, 2020, relative to year 2000 levels. The SCEO approved plans for all of these entities during 2009.

This report provides critical information that allows these organizations to measure their progress in meeting these goals during the period 2004-2008. Subsequent reports will indicate which organizations are continuing to make progress, and which organizations are in need of assistance. The SCEO offers technical assistance to determine which measures will give the organization the "biggest bang for the buck," as well as financing of energy efficiency measures through ConserFund, the SCEO's low-interest revolving loan program, and private sector performance contracting alternatives.

Since 2008, budgets for the school districts, public colleges and universities, and state agencies have been slashed drastically, while energy costs have continued to rise. Improvements in energy efficiency are more important than ever to help these organizations reduce energy consumption, and

mitigate energy cost burdens. This report serves as a valuable tool for organizations and public decision-makers in identifying areas for improvement.

Appendix A: Legal Requirement

This report is mandated by the South Carolina Energy Conservation and Efficiency Act, Section 48-52-620 (E). The principal purposes of this report are twofold:

1. To compile factual information on the current use and cost of energy for public schools, state agencies, and public colleges/universities; and
2. To ensure that state government agencies establish comprehensive energy efficiency plans and become models for energy efficiency in South Carolina, and assist the Department of Education in achieving energy efficiency in public schools [Section 48-52-420(9)].

The preparation of this report assists in accomplishing several other purposes important to energy conservation, namely:

3. To ensure that internal governmental energy use patterns are consistent with the State's long range interests [Section 48-52-210 (B) (9)];
4. To ensure that short-term energy decisions do not conflict with long range energy needs [Section 48-52-210 (B) (8)];
5. To define baseline energy use measurements; and
6. To assist in establishing standards for energy efficiency and building performance.

Appendix B: Methodology

Information requested

Organizations are asked to report the following information for each of their buildings:

1. Building name and address
2. Date of construction and dates of any subsequent retrofits/additions
3. Square footage for heated space and for unheated space
4. Primary building use type
5. Typical periods of operation – hours per day, days per week, weeks per year
6. Energy consumption and cost by month for each energy source: electricity, natural gas, fuel oil, propane, coal and kerosene.

Separate reports are requested for portable or mobile structures and for exterior lighting.

Form of Submission

Organizations may submit consumption data by any of the following methods:

1. Completion of the Energy Consumption Report Form provided by the South Carolina Energy Office.
2. Entering building information and consumption data via the Utility Direct energy accounting system. Public facilities reporting data using Utility Direct generally provides more detailed information about buildings and energy use than those using other reporting methods.
3. Submission of the requested information in other energy accounting formats used by the organization or its energy management contractor

Utility Direct

Utility Direct is a web-based energy accounting system. Subscribers to the system set up accounts for each building and enter monthly utility bill information to track consumption and costs. The South Carolina Energy Office can view each organization's accounts and retrieve data needed to prepare the required report.

Level of Detail

Although the South Carolina Energy Office requests separate reports for each building, some organizations submit only combined reports for their facilities. In order to make comparisons among years, statistics in graphs and tables were adjusted with estimates for organizations not providing adequate data in given years. Missing data were estimated using calculations based on historical trends.

Calculation of Energy Statistics

A systematic change in the reporting of consumption data occurred before the compilation of the 2004-2008 report. Previously, energy data were extracted from the multiple formats, as detailed above, and combined into Excel Spreadsheets.

For the 2004-2008 report, consumption data for each of the report years were combined in the South Carolina Energy Office-maintained energy accounting system Utility Direct. During this process, consumption data were subjected to intense review and, where appropriate, corrections or additions were made using the most current data available. A new feature of Utility Direct permitted the collection of information specifying the function of the line items. These specifications were used to develop new exclusion criteria as follows:

1. Unconditioned space was identified as outdoor lighting, parking lots, parking garages, warehouses, farmer's markets, greenhouses, and sheds, and were not included in use and cost per square foot calculations.
2. Transmission towers with very little square footage, but high use and cost were not included in use and cost per square foot calculations if not sub-metered.
3. Temporary facilities which were not consistently used year round such as portable classrooms, guard shacks, and camp cabins were not included in use and cost per square foot calculations.

These changes necessarily caused the calculated energy statistics for 2004 to be different than reported in the *Energy Use in South Carolina's Public Facilities, Fiscal Year 2004, Thirteenth Annual Report.* Energy statistics reported for years prior to 2004 were unchanged.

Calculation of Savings

The methodology used to determine the amount of energy savings for each type in this report (school districts, state agencies, residential colleges and non-residential colleges) first entailed multiplying the 2008 conditioned square footage for each organization type by the 2004 use per square foot in kBtus. This result is a projection of the total kBtus the respective type would have used in the current fiscal year if not for energy conservation measures. Next, this total kBtu number is multiplied by the current fiscal year cost per kBtu, resulting in the projected amount that would have been spent in the current fiscal year based on fiscal year 2004 energy use rates. Finally, the actual energy expenditures (2008 kBtus per square foot multiplied by 2008 conditioned square footage multiplied by 2008 cost per square foot) are subtracted from the projected amount, yielding the cost savings attributed to energy conservation and efficiency.

Appendix C: Public Facilities 2008 Total Energy Costs Ranked by Total Cost by Type

(Total Costs for Electricity, Natural Gas, Propane, Coal, and Fuel Oil)

Public School Districts

Organization	2008
Greenville School District	$16,080,834
Charleston School District	$9,486,620
Richland School District 1	$7,972,398
Horry School District	$7,549,233
Berkeley School District	$5,146,904
Richland School District 2	$4,845,728
Aiken School District	$4,294,203
Beaufort School District	$4,262,956
Lexington School District 1	$3,701,048
York School District 3	$3,183,524
Dorchester School District 2	$3,128,877
Pickens School District	$2,742,386
Lexington/Richland School District 5	$2,642,104
Oconee School District	$2,280,731
Georgetown School District	$2,271,357
Florence School District 1	$2,252,977
Kershaw School District	$2,132,642
Lancaster School District	$1,949,146
Darlington School District	$1,946,470
Sumter School District 2	$1,929,086
Cherokee School District	$1,875,672
Anderson School District 5	$1,865,732
Lexington School District 2	$1,722,411
Chesterfield School District	$1,721,842
Spartanburg School District 6	$1,651,467
Greenwood School District 50	$1,647,312
York School District 4	$1,612,219
Sumter School District 17	$1,602,392
Spartanburg School District 7	$1,597,598
Spartanburg School District 2	$1,510,983
Colleton School District	$1,337,894
Orangeburg School District 5	$1,325,856
Spartanburg School District 1	$1,146,831
Newberry School District	$1,116,255
York School District 2	$1,114,764
Chester School District	$1,064,673
Marlboro School District	$1,029,130
Anderson School District 1	$1,026,052
Williamsburg School District	$995,358
Spartanburg School District 5	$974,353
Fairfield School District	$947,689

York School District 1	$943,258
Orangeburg School District 3	$852,853
Orangeburg School District 4	$809,976
Laurens School District 55	$798,261
Lexington School District 4	$786,126
Union School District	$727,201
Spartanburg School District 3	$722,791
Florence School District 3	$677,613
Edgefield School District	$661,039
Laurens School District 56	$585,556
Abbeville School District	$582,449
Dillon School District 2	$567,755
Marion School District 1	$564,185
Anderson School District 2	$547,646
Lee School District	$535,282
Clarendon School District 2	$534,982
Lexington School District 3	$511,378
Barnwell School District 45	$488,223
Anderson School District 4	$456,276
Calhoun School District	$442,843
Saluda School District	$436,793
Spartanburg School District 4	$432,591
Anderson School District 3	$407,439
Hampton School District 1	$398,958
Allendale School District	$394,265
Dorchester School District 4	$361,226
Jasper School District	$360,682
Marion School District 2	$342,284
Greenwood School District 52	$329,217
McCormick School District	$311,269
Florence School District 5	$300,691
Bamberg School District 2	$298,210
Hampton School District 2	$282,411
Dillon School District 3	$263,593
Florence School District 4	$252,641
Florence School District 2	$237,178
Clarendon School District 3	$232,005
Bamberg School District 1	$230,597
Greenwood School District 51	$223,918
Clarendon School District 1	$220,297
Barnwell School District 29	$217,079
Marion School District 7	$197,531
Barnwell School District 19	$179,811
Dillon School District 1	$138,904
Totals	$138,530,991

State Agencies

Organization	2008
Corrections, Department of	$16,320,633
General Services	$7,766,766
Mental Health, Department of	$5,772,739
Transportation, Department of	$2,004,236
Disabilities & Special Needs, Department of	$1,867,601
Parks, Recreation & Tourism, Department of	$1,762,874
SC Educational Television	$1,485,325
SC National Guard (The South Carolina Military Department of the Adjutant General)	$1,305,352
Juvenile Justice, Department of	$1,201,664
SC School for the Deaf and Blind	$1,023,011
Vocational Rehabilitation, Department of	$975,677
Public Safety, Department of	$901,621
Natural Resources, Department of	$712,657
Employment Security Commission	$657,798
SC Law Enforcement Division	$541,249
Motor Vehicles, Department of	$438,410
SC Governor's School for the Arts and Humanities	$401,823
Education, Department of	$354,436
Santee Cooper	$353,518
Patriots Point Development Authority	$316,662
SC Governor's School for Science and Mathematics	$283,123
John De La Howe School	$281,392
Agriculture, Department of	$242,581
SC Forestry Commission	$212,067
Wil Lou Gray Opportunity School	$208,989
Labor, Licensing and Regulations, Department of	$185,353
SC State Ports Authority	$132,802
Health and Environment Control, Department of	$130,248
Old Exchange Building	$43,851
SC Arts Commission	$41,590
Commerce, Department of, Aeronautics Division	$35,259
Commerce, Department of, Public Railways	$19,147
SC Sea Grant Consortium	$10,660
State Fleet Management	$1,484
Totals	$47,992,597

Residential Colleges and Universities

Organization	2008
University of South Carolina - Columbia	$19,623,069
Medical University of South Carolina	$15,204,261
Clemson University	$9,967,423
College of Charleston	$4,214,137
Winthrop University	$3,099,047
Coastal Carolina University	$2,899,372
South Carolina State University	$2,898,891
The Citadel	$2,735,448
Francis Marion University	$1,759,474
USC - Aiken	$1,419,880
USC - Upstate	$1,271,660
Lander University	$1,269,591
Denmark Technical College	$379,471
Totals	$66,741,722

Non-residential Public Colleges and Universities

Organization	2008
Trident Technical College	$1,977,204
Greenville Technical College	$1,888,463
Midlands Technical College	$1,392,276
Florence-Darlington Technical College	$1,250,533
Horry-Georgetown Technical College	$930,535
York Technical College	$715,705
Tri-County Technical College	$655,133
Spartanburg Community College	$615,450
Aiken Technical College	$604,738
Piedmont Technical College	$548,293
Central Carolina Technical College	$457,125
Technical College of the Lowcountry	$450,439
USC - Sumter	$428,731
Orangeburg-Calhoun Technical College	$426,087
USC - Lancaster	$399,769
USC - Beaufort	$371,203
Northeastern Technical College	$271,946
USC - Salkehatchie	$180,422
Williamsburg Technical College	$101,015
USC - Union	$72,054
Totals	$13,737,121

Appendix D: Public Facilities 2008 Energy Use (in kBtus) per Square Foot (Sorted Alphabetically)

School Districts

Organization	2008
Abbeville School District	35.9
Aiken School District	41.9
Allendale School District	55.0
Anderson School District 1	43.3
Anderson School District 2	49.2
Anderson School District 3	41.8
Anderson School District 4	38.9
Anderson School District 5	40.3
Bamberg School District 1	38.8
Bamberg School District 2	56.1
Barnwell School District 19	33.0
Barnwell School District 29	47.2
Barnwell School District 45	41.6
Beaufort School District	41.3
Berkeley School District	40.2
Calhoun School District	44.4
Charleston School District	47.3
Cherokee School District	53.1
Chester School District	44.1
Chesterfield School District	36.0
Clarendon School District 1	32.1
Clarendon School District 2	37.2
Clarendon School District 3	37.7
Colleton School District	43.6
Darlington School District	34.8
Dillon School District 1	33.0
Dillon School District 2	36.9
Dillon School District 3	37.4
Dorchester School District 2	46.5
Dorchester School District 4	43.2
Edgefield School District	33.7
Fairfield School District	43.8
Florence School District 1	38.2
Florence School District 2	30.0
Florence School District 3	33.0
Florence School District 4	38.1
Florence School District 5	38.5
Georgetown School District	36.1
Greenville School District	66.7
Greenwood School District 50	63.2
Greenwood School District 51	36.5
Greenwood School District 52	54.7
Hampton School District 1	35.9

Hampton School District 2	56.7
Horry School District	41.4
Jasper School District	47.0
Kershaw School District	46.5
Lancaster School District	42.6
Laurens School District 55	34.3
Laurens School District 56	42.6
Lee School District	29.6
Lexington School District 1	37.5
Lexington School District 2	37.3
Lexington School District 3	29.9
Lexington School District 4	43.3
Lexington/Richland School District 5	33.1
Marion School District 1	42.5
Marion School District 2	34.9
Marion School District 7	36.4
Marlboro School District	40.9
McCormick School District	50.3
Newberry School District	34.7
Oconee School District	46.0
Orangeburg School District 3	38.3
Orangeburg School District 4	48.0
Orangeburg School District 5	40.7
Pickens School District	49.2
Richland School District 1	45.7
Richland School District 2	47.6
Saluda School District	36.4
Spartanburg School District 1	40.4
Spartanburg School District 2	59.7
Spartanburg School District 3	42.5
Spartanburg School District 4	42.6
Spartanburg School District 5	38.5
Spartanburg School District 6	50.2
Spartanburg School District 7	39.6
Sumter School District 17	35.2
Sumter School District 2	36.4
Union School District	38.7
Williamsburg School District	24.6
York School District 1	41.8
York School District 2	39.9
York School District 3	46.7
York School District 4	44.8

State Agencies

Organization	2008
Agriculture, Department of	295.7
Commerce, Department of, Aeronautics Division	230.6

Commerce, Department of, Public Railways	32.9
Corrections, Department of	155.3
Disabilities & Special Needs, Department of	74.2
Employment Security Commission	67.4
General Services	148.9
Health and Environment Control, Department of	55.8
John De La Howe School	58.3
Juvenile Justice, Department of	77.6
Labor, Licensing and Regulations, Department of	63.8
Mental Health, Department of	120.3
Motor Vehicles, Department of	76.4
Natural Resources, Department of	72.3
Old Exchange Building	60.4
Parks, Recreation & Tourism, Department of	78.2
Patriots Point Development Authority	40.3
Public Safety, Department of	83.7
Santee Cooper	112.0
SC Arts Commission	85.4
SC Educational Television	95.8
SC Forestry Commission	34.7
SC Governor's School for Science and Mathematics	114.7
SC Governor's School for the Arts and Humanities	152.2
SC Law Enforcement Division	171.3
SC National Guard (The South Carolina Military Department of the Adjutant General)	29.8
SC School for the Deaf and Blind	142.2
SC Sea Grant Consortium	39.9
SC State Ports Authority	163.6
Transportation, Department of	109.9
Vocational Rehabilitation, Department of	49.2
Wil Lou Gray Opportunity School	68.2

Residential Colleges and Universities

Organization	2008
Clemson University	157.0
Coastal Carolina University	56.4
College of Charleston	99.8
Denmark Technical College	55.0
Francis Marion University	90.2
Lander University	67.9
Medical University of South Carolina	265.4
South Carolina State University	118.1
The Citadel	115.7
University of South Carolina - Columbia	125.0
USC - Aiken	56.3
USC - Upstate	87.5
Winthrop University	100.2

Non-residential Colleges and Universities

Organization	2008
Aiken Technical College	91.4
Central Carolina Technical College	50.9
Florence-Darlington Technical College	93.5
Greenville Technical College	70.4
Horry-Georgetown Technical College	89.2
Midlands Technical College	76.9
Northeastern Technical College	51.5
Orangeburg-Calhoun Technical College	76.4
Piedmont Technical College	62.6
Spartanburg Community College	56.7
Technical College of the Lowcountry	72.5
Tri-County Technical College	81.5
Trident Technical College	81.2
USC - Beaufort	54.7
USC - Lancaster	84.6
USC - Salkehatchie	33.3
USC - Sumter	63.1
USC - Union	41.7
Williamsburg Technical College	34.6
York Technical College	82.0